# MINNESOTA MEDICINE

*Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine, and Minneapolis Surgical Society*

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# Minnesota Medicine

*Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society*

**Volume 31** **January, 1948** **No. 1**

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Minnesota Medicine

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Volume 31 January, 1948 No. 1

# FOLLOW-UP DIAGNOSIS ON PATIENTS WITH X-RAY LESIONS

## With Special Emphasis on Tuberculosis

WILLIAM ROEMMICH, M.D.

S.A. Surgeon, U. S. Public Health Service
Minneapolis, Minnesota

OF the 301,513 examinations in the mass chest x-ray survey conducted in Minneapolis during the summer of 1947, the x-ray interpretation in 3,791 instances was tuberculosis.* If sanatorium admissions were not carefully regulated, application might be made by part or all of these patients for admission to the sanatorium. That, of course, would be impossible, even under such favorable sanatorium conditions as exist in Minneapolis and Hennepin County. Fortunately, only a small portion of patients found to have x-ray lesions suspicious of tuberculosis need sanatorium admission. Therefore, we must devise some follow-up diagnostic procedure which will protect the community against infectious patients, conserve hospital resources, and give maximum benefit to the individual.

Since the start of the mass chest x-ray survey as a case-finding method in tuberculosis, many symptomless patients have gone to their physicians. As our experience with these surveys increases, we are repeatedly impressed with the incidence of other pulmonary and thoracic lesions. We are repeatedly impressed also with the fact that everything which looks like tuberculosis roentgenologically is not tuberculosis clinically. The variety of lesions increases as our diagnostic efforts increase. We know that the differential diagnosis of these intrathoracic lesions, although extremely difficult, becomes a very fascinating and rewarding endeavor. None of them is simple. Even the specialist will need to call freely on the special techniques of his colleagues.

With patients referred from the mass x-ray survey, the physician is faced with an experience which is just a little different from that of his daily office routine. He must urge special diagnostic studies upon a patient who is symptomless. A presenting complaint is " a spot on my lung." The extra effort needed to sell and make an early diagnosis, as compared to that needed when a patient has symptoms or is in the more obvious phases of disease, will be rewarded by a more favorable clinical response.

Perhaps the most prevalent single disease which will need to be considered in the differential diagnosis of lung lesions will be tuberculosis. I should like to limit my discussion largely to that phase of the diagnostic problem. The epidemiological significance of tuberculosis to the community places a grave responsibility on the physician not to rule out tuberculosis or call it inactive without adequate study in addition to the x-ray. The tremendous economic and social implications to the patient and his family make it imperative that the physician exhaust every resource to be absolutely certain that his diagnosis is based whenever possible on bacteriological evidence.

When a patient goes to a physician from a mass x-ray survey, he has at least a miniature film

Read at the annual meeting of The American College of Chest Physicians held in conjunction with the annual meeting of the Minnesota State Medical Association, Duluth Minnesota, July 1, 1947.

Dr. Roemmich is Acting Tuberculosis Control Officer of the Minneapolis City Health Department.

*The figures quoted herein bring the report up to date as at close of survey October 15, 1947.

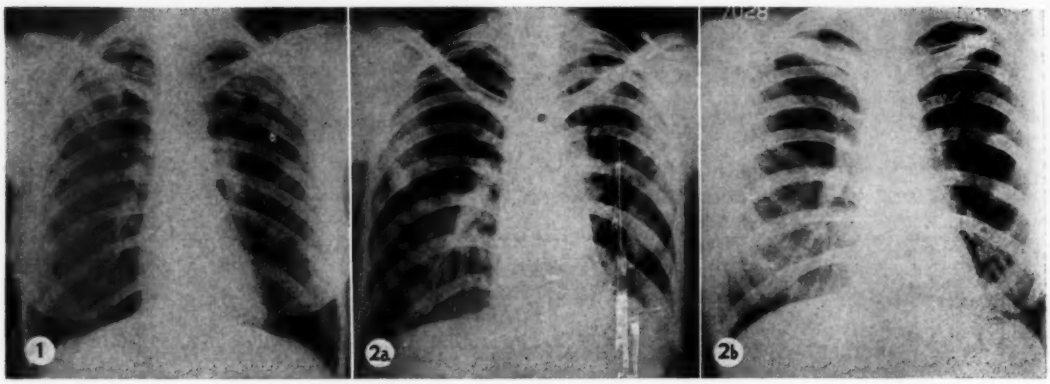


Fig. 1. *Case 1.* H. N., a woman, aged thirty-six, was diagnosed as having definite bilateral fibroid and exudative pulmonary tuberculosis. The diagnosis was made by x-ray only. After four months of intensive study in a sanatorium, tuberculosis was definitely ruled out. The final diagnosis was pulmonary fibrosis.

Fig. 2. *Case 2.* (a) O. R., a woman, aged twenty-eight, was diagnosed as having far advanced pulmonary tuberculosis over the left lung and the middle of the right lung, with bilateral cavitation. The diagnosis was made by x-ray only. (b) After eight months of intensive study, the lesions gradually disappeared. The final diagnosis was subacute Loeffler's syndrome.

reading. Upon this evidence a diagnosis should never be based. In Minneapolis, and in some other projects as well, he also will have had a 14 by 17-inch film. The diagnosis of tuberculosis from x-ray alone is never permissible. To make it in exceptional cases, on a little additional evidence in a very isolated rural area, is understandable. To make it on x-ray evidence only, where laboratory and other special techniques are available, is inexcusable.

What are some of the diagnostic procedures which should be used in the differential diagnosis of tuberculosis? We cannot discuss them all. I would like to suggest four, all four of which can be used by a general practitioner or chest specialist: (1) x-ray, (2) bacteriological studies, (3) tuberculin test, and (4) history and physical examination.

The x-ray is an economical tool in tuberculosis case finding. It is a most useful aid in making a diagnosis of tuberculosis. For follow-up and treatment it is essential. I can think of no diagnostic aid which in recent years has been subjected to such a large scale use—one which has been cross-examined by a skeptical public and not a few in our professional groups. Yet it remains as one of the objective and valuable diagnostic aids. My discussion of its use in the differential diagnosis of tuberculosis is not intended to discredit x-ray but to urge an even wider application with a more extensive use of complementary diagnostic aids. I shall present three cases, two of which were obtained through the courtesy of Dr. Sumner S. Cohen at Glen Lake Sanatorium. These cases illustrate how the x-ray can be used to aid the making of a diagnosis. At the same time they illustrate how hazardous it can be to use x-ray alone. These are not isolated cases; many others might be cited.

### Case Reports

*Case 1.*—H. N., (No. 9752) a thirty-six-year-old woman, went to see her physician on August 20, 1946, complaining of slightly swollen ankles of twenty months' duration. At this time there were no symptoms referable to her lungs. As part of a general physical examination, her physician requested a chest x-ray. The roentgenologist reported definite pulmonary tuberculosis. Application was made to Glen Lake Sanatorium, and within eight days the patient was admitted. There was no history of exposure. Temperature and pulse were normal and remained so throughout her sanatorium stay. The admitting physician reported slight increased whispered voice sounds in both apices. Admission x-rays (Fig. 1) were interpreted by an experienced roentgenologist as follows: "Bilateral fibroid and exudative pulmonary tuberculosis extending to the second right anterior interspace, and to the second left anterior interspace with questionable cavitation in the right apex."

Several x-rays during her sanatorium stay showed no change. Repeated tuberculin tests using the two National Tuberculosis Association standard test doses of PPD, and four doses of O.T. ranging from .1 to 10 mg., were negative. Sputum was absent, and four gastric washings were negative for tubercle bacilli. Other laboratory studies revealed no abnormalties. After four months of study the patient was discharged with a diagnosis of chronic pulmonary fibrosis of unknown etiology.

We must recognize that the exact etiology in this case was never demonstrated. However, I

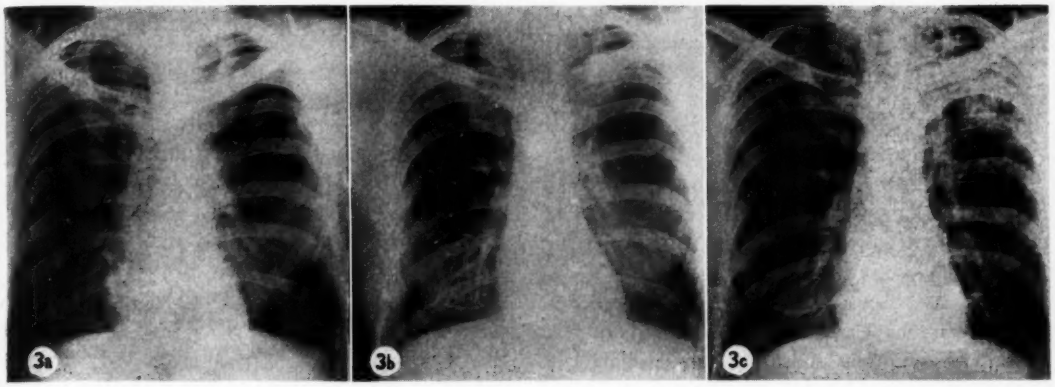

Fig. 3. *Case 3.* (a) H. J., a man, aged fifty-three, was diagnosed in December, 1941, as having "healed primary childhood tuberculosis." The diagnosis was made by x-ray only. (b) An x-ray taken in March, 1943, was interpreted as "no change, healed primary tuberculosis." (c) In March, 1947, fatigue, expectoration and chest pain appeared. The diagnosis by x-ray was reactivation of childhood tuberculosis. Ten sputum smears were negative for acid-fast bacilli, but the first and all subsequent sputum and gastric cultures were positive for tubercle bacilli.

believe the following questions are open for discussion: Could this study have been carried out in the private physician's or specialist's office? Should the patient have been given the original diagnosis with its emotional, social, economic and epidemiological implications?

*Case 2.*—O. R., (No. 7028) a twenty-eight-year-old woman, first noticed a persistent, dry cough in December, 1937. She was pregnant at the time, and in March, 1938, was delivered of a normal infant. At her routine postpartum examination she again complained of a cough. Her physician made a diagnosis of bronchitis and treated her for it without improvement. A single tuberculin test in May, 1938, was negative. In June, 1938, the cough increased. She developed expectoration, anorexia, weight loss, malaise. A chest x-ray was interpreted "pulmonary tuberculosis." A second tuberculin test was positive. One sputum examination was negative.

She was admitted to Glen Lake Sanatorium. There was no history of exposure. Her husband and four children were examined for tuberculosis. Additional history revealed attacks of coughing and wheezing prior to the present illness. Her temperature reached a high of 102° and her pulse 110. The physician's examination at the time of her admission revealed impaired resonance in the upper half of the right lung and over the left lung field. Bronchovesicular breath sounds and increased whispered voice sounds were heard over the left lung field. In addition râles were heard over the fourth and eighth dorsal interspaces posteriorly on the left. An x-ray (Fig. 2a) was interpreted as follows: "Far advanced pulmonary tuberculosis over the entire left lung and middle part of the right lung with bilateral cavitation."

Tuberculin tests done with PPD were negative to all strengths. Fifteen sputum smear examinations were negative. Guinea pig inoculation of sputum was negative, as were stool and gastric cultures. Blood hemoglobin was 78 per cent; the white blood cell count was 12,400, with 54 per cent polymorphonuclear neutrophiles, 28 per cent lymphocytes, 5 per cent monocytes, and 17.5 per cent eosinophiles. Subsequent blood examinations revealed a variation of eosinophiles from 7.5 to 16 per cent. Serial x-rays showed rapid improvement (Fig. 2b). She was discharged in November, 1938, with a final diagnosis of allergic pneumonitis or "subacute Loeffler's syndrome."

The questions which were asked at the end of the previous case might well be repeated here.

*Case 3.*—H. J., a fifty-three-year-old man, was laid off from his job in a foundry in 1941. He had a "spot on his lung." He went to his private physician who made an x-ray and told him he had "healed childhood tuberculosis" (Fig. 3a). He could not regain his job at the foundry, so he obtained a job as a painter and worked until March, 1943, when a second x-ray was taken (Fig. 3b) with an interpretation of "no change, healed childhood tuberculosis."

In March, 1947, he had chest pains and expectoration. He felt very tired. He returned to the same physician for a third x-ray (Fig. 3c) which was interpreted as "reactivation of childhood tuberculosis." Application was made to the sanatorium, but the patient refused the physician's advice and went to a second physician. There he was given a diagnosis of far advanced tuberculosis. No sputum examinations were made.

He was referred to the out-patient department for study. Ten sputum smears over a two-week period were all negative. On April 15 at his first clinic appointment, a gastric wash was done and a second sputum smear was made. Both the sputum and the gastric washing were cultured. All subsequent gastric washings and sputa were cultured. On May 27 the first sputum and gastric cultures were both reported positive for tubercle bacilli. He was admitted to the sanatorium for treatment.

One might ask the questions: "Should a bacteriological study have been done in 1941?" "What would have been the result?" "If repeated in 1943, what would have been the result?" "Should the patient have gone from December, 1943, to March, 1947, without follow-up studies?" "Should we ever be satisfied when a smear is negative?" This patient had fifteen smears; of these the first two cultures were positive within four weeks.

The x-ray is a valuable tool in the diagnosis of tuberculosis. Unless, however, it is complemented by clinical and other laboratory studies, it may be hazardous to the individual and the community. I believe Dr. Rigler expresses a somewhat similar opinion in his handbook on *The Chest*. "Next to positive sputum characteristics, x-ray findings are the most definite evidence of the presence of pulmonary tuberculosis. X-ray signs of pulmonary tuberculosis do not necessarily indicate activity or quiescence of a lesion. In some cases the activity can be determined, but in many it is impossible to decide on the stability of a lesion unless repeated studies are made." As our experience with mass radiography increases, and as more and more competent laboratories intensify their search for tubercle bacilli, we realize that a lesion may be stable on x-ray for one year or more and still yield positive culture and other laboratory and clinical evidence of activity.

I would like to close the discussion on x-ray as a diagnostic technique with a quotation by Dr. J. A. Myers from *The Evolution of Tuberculosis—1921 to 1941*. "We must remember that we are inspecting only shadows of gross pathology and that shadows of tuberculous lesions may appear identical with those of other diseases that attack the lungs. Therefore, we have long since discontinued attempts to make so-called x-ray diagnoses, as it is a physical impossibility to determine whether a given shadow represents disease produced by tubercle bacilli or by any one of several micro-organisms, as well as by malignancy."

If only one criterion must be used to make a diagnosis of tuberculosis, the physician can do no better than to use bacteriological evidence. This is difficult, time-consuming, and not too satisfying to both physician and patient, who live in an age of speed. However, if one has available a competent laboratory, this method will be the most accurate. It will conserve community resources; it will provide the information needed for modern treatment and intelligent epidemiological control.

TABLE I. POSITIVE GASTRIC WASH VERSUS POSITIVE SPUTUM

| Type of Patient | Number and Per Cent of Patients | Number and Per Cent of Examinations | Number and Per Cent Positive |
|---|---|---|---|
| No sputum | 71 (15.3) | 401 (14.0) | 211 (52.6) |
| Negative sputum | 111 (23.9) | 783 (27.3) | 314 (40.2) |
| Positive sputum | 282 (60.8) | 1682 (58.7) | 746 (44.3) |

Feld, in Am. Rev. Tuberc.: 7.5 per cent of positive gastrics become sputum positive within six months.

What can we expect from bacteriological diagnosis with a good laboratory? What studies should the physician request? How should these be integrated with the other diagnostic studies on his patient?

Feld studied intensively 868 adults admitted to the sanatorium with x-ray diagnosis of tuberculosis. In 464 of them, he was able to make a bacteriological diagnosis. He believes that he obtained bacteriological evidence on all patients with active tuberculosis. He performed from one to thirty bacteriological studies per patient depending on clinical indications. He states that 60 per cent can be diagnosed by sputum cultures alone, 24 per cent have a negative sputum but become positive with gastric culture, and 15 per cent have no sputum but gastric culture is positive (Table I).

There is some question about the 23 per cent with negative sputum and positive gastric culture. Hilleboe and Holm suggest that in the presence of sputum a gastric culture is not necessary. Feld's figure, 24 per cent negative sputum and positive gastric culture, would be smaller, I believe, if the clinician made sure that sputum came from the lungs and not from the sinuses. If there is doubt in the clinician's mind as to source of sputum, a gastric wash should be requested. A gastric wash is indispensable in children.

The physician may ask immediately, "How many sputum and gastric studies shall I do before I decide the patient is inactive or at least sputum-negative?" Serial x-ray will help in deciding whether a lesion is progressing or regressing. If there is progression and, especially in the presence of cavity, expectoration, and if continued sputum cultures in competent laboratories re-

TABLE II. STUDY OF CONSECUTIVE ASPIRATIONS

| Aspirations | Number of Patients | Per Cent Positive |
|---|---|---|
| 1 | 292 | 71.1 |
| 2 | 378 | 92.0 |
| 3 | 395 | 96.1 |
| 4 | 406 | 98.8 |
| 5 | 411 | 100.0 |

main negative, the physician must intensify his study for a non-tuberculous etiology.

Pinner says, "I have found it a practical working rule but not an iron-clad law to state that a patient with more than a minimal lesion, with evidence of activity and with reasonable amount of sputum, has probably not pulmonary tuberculosis if, on complete studies of frequent sputum and gastric samples, tubercle bacilli cannot be demonstrated."

If there is no sputum, what can we expect from gastric culture? Feld again gives some practical suggestions as to what may be expected from a gastric lavage. He found that one gastric aspiration yielded 71 per cent of those which would ultimately be positive, a second, 92 per cent, and so on, until a fifth would yield 100 per cent. (Table II). Unfortunately, he does not give a time interval between studies.

These studies agree basically with very intensive studies by Dr. Holm and his co-workers of Denmark. Dr. Holm gives a little additional information in a personal communication, from which I quote: "A smear will reveal about 20 per cent bacteriologically positive cases of tuberculosis, sputum cultures an additional 40 per cent, gastric cultures the last 40 per cent."

These figures give some idea of what has been done in competent laboratories. What can be done in each physician's laboratory will depend on the number of culture tubes used per specimen, the type of media used, the care with which culture material is prepared for culture, the care with which it is collected, and, as Glen Lake repeatedly points out, how promptly it is sent to the laboratory. By no means of least importance is the experience of the bacteriologist in culturing tubercle bacilli. This list of variables does not exhaust the factors which must be considered in determining dependability of culture work in tuberculosis.

The tuberculin test is another diagnostic aid in the differential diagnosis of tuberculosis. There is no test in the field of medicine that has been more extensively used and the results so carefully checked by post-mortem examination as the tuberculin test.

I would like to discuss some significant aspects of tuberculin sensitivity. I will refer specifically to Florence Siebert's preparation of PPD at the Phipps Institute. However, in its application as a diagnostic tool, the principles apply as well to intracutaneous testing with other PPD preparations and accepted preparations of Old Tuberculin. Intensive studies with this specific preparation probably represent the general pattern of tuberculin sensitivity.

It is evident that the quantitative titration of tuberculin sensitivity by the use of different concentrations yields information which throws considerable light on the diagnostic interpretation of the reaction. When the tuberculin sensitivity of each individual making up a population group is known, it is possible to construct a curve of tuberculin sensitivity for that group. When the same tuberculin solution and testing techniques are used throughout, it is possible to compare all curves of tuberculin sensitivity of various population groups. Such studies have been carried out by the U. S. Public Health Service and others. From such studies it is apparent that almost all persons tested react to tuberculin if large enough doses are injected and that certain persons react to very small doses of tuberculin. In the main, those groups who react to large doses of tuberculin only are among those with non-contact histories. Conversely, the majority of those who react to very small doses either have tuberculosis or a history of contact with it. Thus the non-contact group is relatively insensitive to tuberculin, while the contact group is highly sensitive.

Dr. Palmer points out that the sensitivity curves of a group, all of whose members have a history of contact or actual tuberculosis, differ markedly from those having no contact history. The difference is primarily that there is a greater percentage of reactors to smaller test doses. It is significant that not all children, even though proven contacts of open tuberculosis, are reactors. In two large groups tested, only 79 and 76 per cent reacted. Three possible explanations of this failure of persons with a history of contact to react to small doses of tuberculin must be considered.

1. These persons have been infected with the tubercle bacilli and have not yet become hypersensitive. Dr. J. A. Myers and his staff at the

Lymanhurst Clinic in Minneapolis showed that it takes from three to seven weeks for sensitivity to develop to a degree detectable by the tuberculin test. Having once become hypersensitive to tuberculin, they have subsequently become anergic.

2. Although they had lived in contact with open tuberculosis, they have not been infected.

3. Contact may have taken place with inactive tuberculosis.

The exact significance of skin reactions which are obtained only through large doses of tuberculin is not clear. There are reasons, however, which make it appear likely that these reactions are not specific, or in other words, they are not due to infection with the tubercle bacillus. In the first place, since almost everyone reacts if a large enough dose is used, it would have to be assumed that almost all persons tested have been infected with tubercle bacillus. Such an assumption seems unwarranted. In the second place, the character of the reactions to the larger doses of tuberculin is less stable over a period of time than that of the reactions to the smaller doses. It appears likely, therefore, that reactions occurring with large doses of tuberculin are not specific. This may be even more true when O.T. is used, which has, in addition to protein, a polysaccharide and nucleic acid constituent. It becomes important, therefore, to determine if possible at what dose of tuberculin the nonspecific character becomes evident. The U. S. Public Health Service is now recommending a one-dose technique using .0001 mg. PPD. As you will see later, with this as a first test dose, very little tuberculosis will be missed by omitting the second test dose. Dr. Palmer believes that the one test dose will pick up all significant tuberculosis and will not exclude significant tuberculosis. If we could eliminate a second dose and lose very little in diagnostic value, it would be very advantageous in case finding and clinic procedures. This suggestion needs careful clinical evaluation.

In Dr. Palmer's experience with over 500 cases of tuberculosis, more than 99 per cent reacted to .0001 mg. PPD. This dose is five times more concentrated than the N.T.A. first testing dose. Similar findings are reported by Long on 609 tuberculosis cases at the Phipps Institute. He reported that 94 per cent of the white and 96 per cent of the colored tuberculosis patients reacted to first testing strength of the PPD or O.T. After larger doses are used it should be with the realization that they may invoke nonspecific reactions and that such reactions occur with increasing frequency as the dosage is increased (Fig. 4).

What is a non-reactor, and what is a reactor? At the present time the N.T.A. is recommending the two-dose method of tuberculin testing. The first dose is .00002 mg. of PPD, and if the person is a non-reactor, a second dose of .005 mg. of PPD is given. The test should be read preferably at the end of a seventy-two-hour period but can be read in forty-eight hours. The reaction is indicated by an area of edema in the skin at the site of administration. This area should be at least 5 mm. in diameter for the first test dose, and 10 mm. for the second. In interpreting the tuberculin test, it is far better to use the sense of touch than the sense of sight.

I should like to summarize the use of the tuberculin test in diagnosis as follows: The tuberculin test, if properly used, will tell whether infection has taken place. If it is applied repeatedly, and if the activity of the product has been established, a non-reactor either does not have tuberculosis, is in the preallergic or the terminal stages of disease, or has lost his sensitivity. In the latter case there are no living organisms left in the body. If an x-ray pulmonary lesion is present in a non-reactor at the end of eight weeks, the lesion should be considered non-tuberculous.

The fourth and last diagnostic aid which I should like to discuss briefly is the history and physical examination. It perhaps is the oldest of the four diagnostic techniques discussed today. It has been discredited by some recently. They have suggested throwing the stethoscope away; early tuberculosis is symptomless and signless. That early tuberculosis is symptomless and signless in a majority of instances is very true. If we knew that patients who come to us from mass surveys had tuberculosis, we could throw away not only the stethoscope but all other diagnostic aids. But we don't know what these patients have. We don't know they are signless and the only way to find out is to do a physical examination and find out. In the differential diagnosis of tuberculosis there are many diseases which look like tuberculosis roentgenogically but actually may be other infections or malignancies which do cause physical findings, such as palpable nodes and fever. A rectal examination or abdominal palpation may reveal the primary focus of what looks like tuberculosis in the chest. A history of significant

contact with an open case, closed case, or terminal case, if present, strengthens the evidence for tuberculosis.

The history especially has far-reaching diagplosive implications. The chips are all down; the patient holds low cards. If the patient has tuberculosis, then, according to Plunkett, who has made a study of costs, the physician is about to

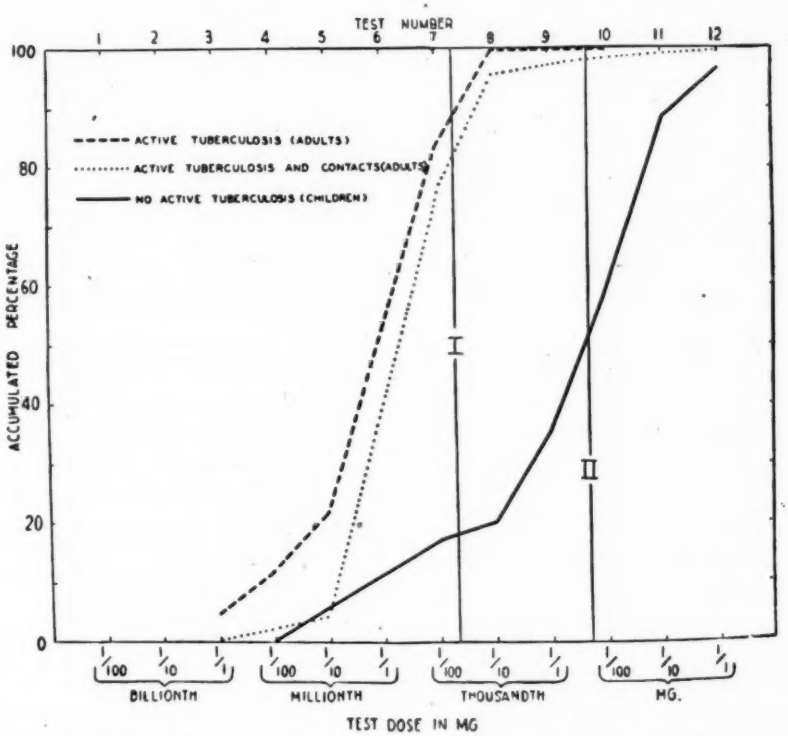


Fig. 4. Accumulated percentage of positive reactors to various test doses of PPD among 468 adults with active tuberculosis and 553 orphanage children with no apparent active tuberculosis. The vertical markings I and II represent the approximate levels of the first (0.00002 mg.) and second (0.005 mg.) strength doses of PPD as usually recommended.

nostic value and cannot be too detailed. No matter how diplomatic the letter which referred the patient from the mass survey to the physician, many patients are frightened at first. Later, after the first shock of "something wrong with my lungs" has been dissipated, they will throw up a protective barrier of "I'm not sick," or "I've never felt better in my life." They are only too eager to hear that nothing is wrong. The physician must use great caution to establish in the patient a delicate balance between a healthy respect for the possibilities behind a positive x-ray and at the same time help him face his anxiety. Here the physician goes from the objective aspects of medicine to the art of medicine.

The first clinic visit of a patient referred from a mass chest x-ray survey is loaded with expresent him with a bill for $10,000. That is the average cost in lost wages and medical expenses between diagnosis and end of treatment or death. But the physician is going to do even more than that. He will suggest segregating the patient from his family. This, of course, has profound sociological and biological implications. The latter are often responsible for the patient's failure to accept "the cure" or for not taking it well. This first clinic visit may determine whether the patient will accept the physician's recommendations at all, or whether he will continue to spread disease to the community and, if early treatment has value, throw away his best chances for future health. A careful history, and time to get acquainted with the patient and his problems, will make follow-up with community funds less

costly. A physician who makes disposition of a patient with an intrathoracic lesion needs all the information obtainable through the most meticulous history and physical.

By using four diagnostic aids in making a diagnosis of tuberculosis, or in ruling it out, the physician cannot go far wrong: first, x-ray examination and competent interpretation; second, competent and persistent bacteriological study; third, the tuberculin test; and fourth, a careful and detailed history and physical. A diagnosis of tuberculosis based on these criteria, or ruled out through them, is based on scientific fact. It protects the community and the patient. It will not needlessly disrupt the sociological, economic and biological needs of the patient and his family.

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## NEEDLESS DIPHTHERIA DEATHS

No matter how wonderful the discoveries of medical science, they are of no practical value unless applied. Neglect to make full use of preventive measures against diphtheria is proved by the fact that in 1946, there were 121 more deaths from this disease in the United States than in the record year of 1941. The *Journal of the American Medical Association* (Vol. 134, p. 1540) has gathered statistics from nearly a hundred cities of the deaths from diphtheria in 1946. Thirty-one municipalities had a perfect record. In ten more, the mortality was exclusively among nonresidents. Children who live in rural districts where immunization is not thorough are often taken to city hospitals if they become sick. Twenty-seven cities had no diphtheria or typhoid mortality in the year, seven others none of residents. Fourteen New England cities had four times as many diphtheria deaths as in the previous year. Boston had twenty-two, as against one each year in 1942 and 1943. It is clear that infants and preschool children should receive their protective treatments and protective boosters on entering school, and later in life when conditions indicate this is desirable.—*Good Health,* November, 1947.

# EVALUATION OF ANTICOAGULANT THERAPY IN DEEP VENOUS THROMBOSIS OF THE LOWER EXTREMITIES

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THE high incidence of spontaneous thrombosis in the cerebral and coronary vessels needs little emphasis. The frequency of spontaneous thrombosis in the deep leg veins, however, has not been generally appreciated until recently. Hunter found such thromboses in 44 per cent of routine autopsies, usually primary in the calf and extending to the femoral only secondarily. The frequency was higher in medical than in surgical autopsies.

## Diagnosis

Little time can be spared for discussion of diagnosis. Hot thrombophlebitis, with fever, leukocytosis, local heat, swelling, tenderness, and positive Homan's sign, lies at one extreme; bland thrombus formation or phlebothrombosis, with few signs—perhaps a pulse rise, slight soreness, or swelling—and with frequent early embolism, lies at the other. Any given case can lie anywhere in the range between.

## Incidence

Barker and E. V. Allen, at the Mayo Clinic, estimate venous thrombosis to occur in 1 per cent of surgical patients, and fatal embolism to occur in one in five of these if specific therapy is omitted. In some groups, those with sepsis, those having pelvic operations, and particularly those with ulcerative colitis, the incidence is far higher.

## Methods of Therapy

Various methods of therapy have been exploited:

1. Expectant therapy has been abandoned because of high immediate risk, five to six weeks of immobilization, and high incidence of permanent pain and edema.

2. Lumbar novocaine block of Le Riche and Ochsner is occasionally spectacularly successful but not regularly so. The University Hospital staff has almost abandoned it, primarily because of two fatal emboli immediately following injection.

3. Paine and Levitt found some benefit to follow intermittent venous occlusion.

4. Pendergass and Hodes found some decrease in edema to follow x-ray therapy.

5. Day found use of snug bandages and early walking effective. No experience with this therapy has been had at the University.

6. Fine, A. W. Allen, and others have advocated superficial femoral vein ligation in the prevention of emboli, and present very convincing figures. Veal and Hussey, and others, even tie the vena cava for many cases. The common femoral should not be ligated.[6]

7. Anticoagulant therapy employs heparin, first introduced as a therapeutic agent by Murray in 1938, and championed by many,[2,3,4,9,11] and dicumarol, isolated at the University of Wisconsin, and employed vigorously in clinical cases by Barker, E. V. Allen, and their associates at the Mayo Clinic.

## Experience with Phlebitis

In association with Drs. H. P. Berge, W. P. Eder, and Kenneth Lister at the Minneapolis General Hospital, and with Drs. Davitt Felder, Ivan Baronofsky and George Moore at the University Hospitals, I have had an opportunity to evaluate several of these methods of therapy in the past few years. It soon became apparent that the choice to be made was primarily between the use of ligation and the use of anticoagulants.

Because there seem to be no reports in the literature on unbiased evaluation of these two modes of therapy, an effort was made to do so. A general plan was laid out, cases in 1945 being treated primarily by blocks and ligations at the University and primarily by dicumarol at the General; the modes of therapy were to be switched at the beginning of 1946 at each hospital. Unfortunately, I did not have control of all the cases, and numerous aberrations from the plan occurred, but the information obtained represents an honest effort to make the most of each type of therapy.

From the Department of Surgery, University of Minnesota Hospitals, and the Department of Surgery, Minneapolis General Hospital. Supported by a research grant from the Graduate School of the University of Minnesota.

Read at the annual meeting of the Minnesota State Medical Association, Duluth, Minnesota, July 1, 1947.

TABLE I. EXPERIENCE WITH THROMBOPHLEBITIS

| | Minneapolis General | University | Total |
|---|---|---|---|
| Anticoagulants alone | 27 | 65 | 92[1, 2] |
| Deaths | 0 | 1[3] | 1 |
| Total femoral ligations | 6 | 10 | 16[4] |
| Ligations alone | 2 | 7 | 9 |
| Deaths | 1 | 1 | 2[5] |
| Ligation-dicumarol | 4 | 3 | 7 |
| Deaths | 0 | 0 | 0 |

[1] Only three of seventy-six pateints followed had late pain or edema.
[2] Four patients had hematuria, which was disregarded; two patients had serious hemorrhage which stopped treatment, both are well.
[3] Inadequate heparin because of general sepsis and hemorrhagic diathesis; died of embolus.
[4] Four of twelve patients followed had late pain and/or edema.
[5] Emboli after ligation. One other patient developed hot thrombophlebitis three days after bilateral ligation for other side.

## Mechanism

The mechanism of intravascular clotting is essentially as indicated in Figure 1. Thromboplastin is not normally free in plasma, but is released following agglutination of platelets. The result is a combination of calcium ion and prothrombin, both normally free in plasma, to form thrombin, which in turn combines with fibrinogen to form fibrin. Heparin interferes with at least two of these processes, possibly all. Dicumarol, on the other hand, lowers the prothrombin blood level by blocking production in the liver.

Employment of these drugs in phlebothrombosis is effective because it prevents propaga-

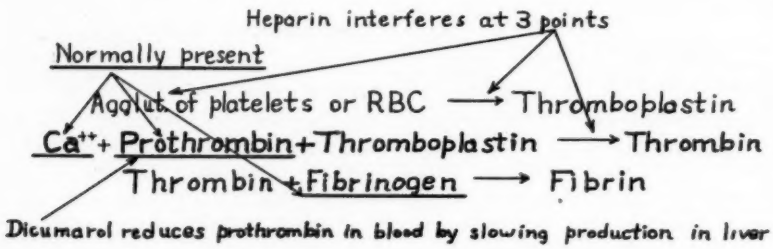


Fig. 1. Probable mechanism of intravascular clotting.

Blocks were disappointing and are omitted from this presentation. In the past year the anticoagulant therapy at the University Hospitals has been taken over by Dr. Davitt Felder, who has performed a superlative study on which he will report fully at a later date.

Table I indicates the combined experience. Of ninety-two patients given anticoagulant therapy alone, one death occurred. In this instance generalized sepsis and a marked hemorrhagic diathesis combined to make ligation impossible and anticoagulant therapy inadequately applicable; she died of embolus. Of these ninety-two patients, seventy-six have been followed; only three have late pain or significant edema. Two of these ninety-two cases suffered severe hemorrhage requiring cessation of therapy. Both are well today. Review of the occurrence of two fatal emboli after ligation, and the occurrence of hot thrombophlebitis in one patient three days after ligation of the superficial femoral vein, together with the high incidence of late symptoms, led all of us to be all the more impressed with the good record achieved with anticoagulants.

tion of the clot and blocking of venous and lymphatic collaterals. It is apparently only freshly formed clot which embolizes, and adequate anticoagulant therapy for three or four days allows the already formed thrombus to become firmly anchored without fresh clot formation; therefore full activity can then be allowed with little risk.

## Plan of Use

In uncomplicated cases of venous thrombosis the combined experience has led to the use of dicumarol alone. As indicated in Figure 2, the usual plan is to give 300 mg. orally the first day and 200 mg. the second. Therapy thereafter is guided by prothrombin time determination daily, the value of which is the indication for each day's dose. The therapeutic range of prothrombin time is two and a half to three and a half times the value of the control from a normal person, which must be run with every batch of determinations because of the unavoidable variations in the thromboplastin which is added. Usually the therapeutic range is reached in about three days and the dosage required is about 100 mg. daily. Because of the lag in effect, the direction of the

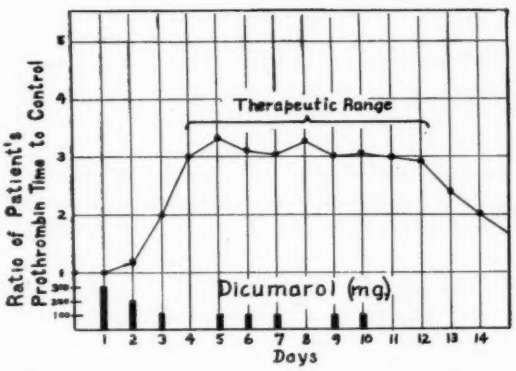


Fig. 2. Example of response of prothrombin time to dicumarol. Wide variations occur and daily prothrombin time determinations are essential.

curve as well as the absolute value must be used as a guide in dosage. Return of readings to normal requires five to fifteen days after cessation of therapy.

Hemorrhage is a serious complication, and may be concealed. Blood transfusion supplies enough prothrombin to bring the prothrombin time down to almost normal for eight to ten hours, but 60 mg. of synthetic vitamin K must be given at the time of transfusion to keep the level down. It is well to repeat this latter in another twelve hours. Minimal microscopic hematuria does not necessitate cessation of therapy.

For best results, patients are kept in bed until symptoms have disappeared, and therapeutic levels are maintained four to five days after ambulation begins.

In such acute emergencies as pulmonary emboli and rapidly spreading femoral thrombosis, the experience mentioned has led to the conclusion that heparin should be given intravenously, because of the quick response, until therapeutic levels of prothrombin time elevation have been reached with dicumarol. Continuous intravenous heparin drip infusion has been found too difficult to control and therefore dangerous. Preferable is intravenous injection of 30 to 50 mg. every three hours, the dose being adjusted to raise the capillary clotting time to 20 to 25 minutes at one hour after each injection. One or two clotting time determinations per day suffice. Clotting times are found to return approximately to normal before each injection.

## Discussion

In general, the employment of dicumarol must be restricted to areas served by good laboratories where well-trained technicians are on hand for daily determinations. Prothrombin time determination is treacherous and not to be relied upon in the hands of a novice, and variations in response to dicumarol, and strength of different batches of the drug, make laboratory control absolutely imperative.

In areas not served by such a laboratory, heparin therapy on the plan indicated may be employed throughout the necessary period of therapy, usually running seven to fourteen days.

## Prophylactic Use of Anticoagulants

My personal experience with the prophylactic use of dicumarol in patients undergoing ileostomy for chronic ulcerative colitis confirms the findings of Allen and his associates. In this disease 25 to 30 per cent develop venous thrombosis postoperatively in the absence of specific therapy. In the last twenty cases, only three patients did not have 100 to 300 mg. of dicumarol the night before operation; these three died of pulmonary embolism; all others recovered without evidence of venous thrombosis.

## Conclusion

Combined experience at the Minneapolis General Hospital and at the University of Minnesota Hospitals indicates that anticoagulant therapy is more effective than other measures in the management of deep venous thrombosis in the legs.

The general plan of therapy is presented.

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*(Continued on Page 65)*

# EARLY POSTOPERATIVE AMBULATION

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EARLY postoperative ambulation is designed to maintain normal physiologic functions of the body after surgical treatment. The procedure denotes activity starting in the first six to twenty-four hours after operation, encouraging the patient to be up and about with continuation of normal physiological processes.

Prolonged postoperative bed rest exaggerates undesirable physiological changes, thereby increasing the possibility of critical complications during convalescence. The changes are caused by mechanical and nervous factors affecting the respiratory, circulatory, gastrointestinal and genitourinary systems. Prolonged bed rest produces pulmonary complications in 2 to 4 per cent of all surgical patients. Fifty per cent of such complications occur within the first twenty-four hours and 75 per cent within the first forty-eight hours after operation. Circulatory complications such as thrombophlebitis and pulmonary embolism occur in from 1 to 4 per cent of all surgical procedures. Approximately 25 per cent of surgical patients confined to bed have urinary retention and constipation.

Present-day surgical gentleness and skill combined with excellent anesthetic facilities permit handling and revision of various anatomical systems without effect on the rest of the body. Continuance of normal function of the remaining organism is maintained. Activity of the entire organism is conducive to adequate pulmonary ventilation. Atelectasis is further prevented by persistent cough activity and the coincident increased venous return produced by negative pressure within the thorax. Early activity maintains cardiac output with attendant good arterial supply and associated venous return insuring oxygenation of all parts. Thus, there is a complete avoidance of general and special tissue anoxemia due to venous and arterial stasis.

The procedure maintains function of the gastrointestinal system, unless continuity has been disrupted. Ingestion of fluids and regular diet produces a solid food bolus which continues normal forward propulsive intestinal peristalsis, thus eliminating collections of gas, abdominal distention and the necessity for catharsis or enema. Full activity of the genitourinary system is provided (inactivity of which seems to be related to dysfunction of the central nervous system in many instances), thus reducing or eliminating the need for catheterization and the frequent complication of urinary cystitis.

Activity of the central nervous system with good co-ordination thereof and improved general physiological function of the body is assured. Delay of institution of activity because of spinal anesthesia has long ago proved unnecessary, in that such activity need be delayed only long enough to permit resumption of function of the lower extremities.

The only hazard of early postoperative ambulation is disruption of an operative wound. If the wound has been properly secured by gentle, complete, smooth apposition without traction, disruption of the wound in an ambulatory patient is no more frequent than in a bed patient. Poor wound apposition produces frequent disruption, whether the patient be in bed or active, and without regard to closure material. Disruption of a wound is usually predictable because of known malnutrition or inadequate closure. Prevention of disruption of abdominal wounds may be aided by primary reinforcement of all questionable wounds at the time of repair. Such wounds should not be subjected to early postoperative ambulation.

Limitations of the procedure must be recognized, and use of the method must be tempered with adequate judgment. It is evident that the procedure cannot be patternized but must be fitted to each individual case. Nevertheless it is suited for the clean, uncomplicated case. The individual seriously injured by chemical, bacterial, or traumatic agents, still requires the basic therapy of complete rest with controlled physiology, chemotherapy, et cetera, and is not amenable to early ambulation. Thus, the latter must take the additional risk incident to prolonged bed rest.

Read at the annual meeting of the Minnesota State Medical Association, Duluth, Minnesota, July 1, 1947.

### Method of Ambulation

Postoperative orders concerning early ambulation note the following procedures:

1. "MS gr. 1/6 or 1/4 prn q 4 h for pain." It is noted in all cases of early postoperative ambulation that the number of doses of such medication is greatly reduced and within two to three days proves entirely unnecessary.

2. "Ventilate ($CO_2$) and cough q 15 minutes x 4—q 1/2 h x 4—q 1 h x 4—then q 2 h." This order is designed to encourage ventilation and hyperexpansion of the pulmonary system, and reduce collections of mucus or mucous plugs. There is a coincident increase of intrapulmonary negative pressure, with aspiration of venous blood through the vena cava and increased venous flow and reduced venous stasis. The latter effect minimizes the production of thrombosis in the large vessels of the lower extremities and the pelvic region, and decreases the number of postoperative embolic phenomena from such thromboses. The order in relation to ventilation includes a secondary order wherein the patient is directed to cough at regular intervals, supporting the abdominal wound with the hand. It is felt that active coughing again minimizes collection of mucus and formation of mucous plugs, decreasing pulmonary atelectasis and collapse.

3. "Move lower extremities and turn from side to back to side q 15 minutes x 4—q 1/2 hr x 4—q 1 h x 4—then q 2 h." This order is intended to facilitate muscular activity of the lower extremities as well as drainage of the venous system by gravity, muscular activity acting as a pumping mechanism to insure venous flow and activity. The turning process is designed to avoid posterior pulmonary congestion or hypostasis, and also permits increased pulmonary ventilation.

4. "Patient to stand (or sit) at bedside to void." This order is designed to encourage the patient to resume weight bearing as soon as possible, and facilitates urination, particularly in male patients, many of whom find it difficult to void while in the supine position.

5. "Encourage full back rest at once." The patient is encouraged to assume a normal sitting posture as soon as his general anesthesia permits. No delay in assuming such position is afforded the patient because of having a spinal anesthesia, as experience has noted that the number of individuals developing a postoperative spinal anesthesia headache is no greater in those who assume activity at once than in those who are placed under a regime of delayed activity and flat in bed position. The patient is ordered up in a chair at the end of twenty-four hours and permitted to move about to the bathroom and as he may desire.

6. "All fluids and a regular diet at once." The function and mechanism of the gastrointestinal tract is carried on as before operation to afford no change in the normal physiology thereof. The exception, of course, is where there has been any profound disruption of the intestinal tract, which necessitates rest thereof during its own healing process.

These orders and procedures are applicable to most patients. Modification of an early ambulation program is necessary for the individual who is psychosomatically unable to adjust to such procedure. Patients should be informed and instructed concerning the conduct of their postoperative treatment when early ambulation is intended.

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### UNIVERSITY OF TEXAS SPONSORS FIRST MEDICAL DEPARTMENT AFFILIATED UNIT

The University of Texas is the first institution to become a member of the Army Medical Department's Postwar Affiliation Program, Brig. General George E. Armstrong, Deputy Surgeon General, announced recently.

Additional units, both general and evacuation hospitals, from other leading medical schools and hospitals throughout the country will be activated this year.

The professional members of these new hospital units will be drawn from the faculties and staffs of the medical schools and hospitals which sponsor them. The personnel will be trained in Army methods and procedures so that in the event of mobilization these units will be prepared to take the field with the minimum of delay.

In World War II there were seventy-three units, comprising general, evacuation, and portable surgical hospitals, which were brought into the service. These affiliated units make an important contribution to the high standards of medical care given by the Medical Department during the war.

The Medical Branch of the University of Texas sponsored a general hospital—the 127th—in World War II from October, 1943 to September, 1945. The 127th General Hospital performed outstanding service in the European Theatre of Operations.

The school has agreed to sponsor a 1,000 bed general hospital in this postwar program. Dr. Chauncey D. Leake, Vice President of the Medical Branch of the University of Texas, signed the agreement with the Department of The Army. This medical school is located at Galveston, Texas.

# HYPERTENSION—MEDICAL TREATMENT

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THE importance of hypertension as a medical problem becomes apparent when it is realized that about 15,000,000 people in the United States have some degree of elevation of the blood pressure.[20] When one reflects upon our lack of understanding of the origin of this disorder and our lack of progress in its treatment, the great magnitude of the problem is again apparent.

In such a widespread disorder as this one, it is natural for the layman to hold certain views concerning it. These have in large part been based upon mortality statistics derived from insurance companies, all of which tend to emphasize the high death rate associated with hypertension. That this is true cannot be denied. However, there is a phase of the prognosis of hypertension which has received little attention; perhaps it does not lend itself easily to statistical analysis. It is the fact known to all physicians that many hypertensive individuals have a favorable outlook for a normal life expectancy, with relatively little impairment in health. This is especially true of women. Our viewpoint on prognosis should acknowledge this brighter side and emphasize it. Perhaps in the future, statistics on this optimistic phase of the prognosis will be available.

Any plan of treatment which is used should be carried out with due regard to certain well-known collateral clinical observations. For instance, it is fundamental to know that individuals with hypertension show marked variations in blood pressure throughout the day. The first reading taken in the doctor's office is almost invariably higher than the second one taken hours later. Consequently, if the effects of treatment are to be assessed, basal before and after levels must be taken. Palmer[12] has reported that transient normal levels are seen in 23 per cent of cases of early benign hypertension, 11 per cent in moderate hypertension, 8 per cent in advanced cases and 8 per cent in malignant cases.

At this point it might be well to say a few words about transient nervous hypertension. This syndrome occurs between the ages of eighteen and fifty, and when present may confound the examiner who wishes to make a decision as to the presence or absence of hypertensive disease. Levy et al[11] studied the military records of many thousands of army officers with this syndrome, and brought forth the conclusion that individuals with transient hypertension are more likely to develop sustained hypertension than those with normal pressures, and, furthermore, if transient tachycardia and overweight were also present, the predisposition was still greater. When one encounters an individual with transient hypertension, he probably should be regarded as a future permanent hypertensive. However, a great deal of harm will be done if the treatment from this standpoint is too vigorous or too dogmatic, for there are a certain number of these individuals—the figure has not yet been determined—who will never develop permanent hypertension, and these may be harmed by ill-considered advice. Rogers and Palmer, in a small group of patients with transient hypertension followed for more than three years, found that half of them still had normal blood pressures. The ultimate prognosis of individuals with transient hypertension in terms of percentage must await further long-range studies. In regard to fluctuating blood pressures, it might also be mentioned that the hyptension seen at the menopause has been shown to have no relation to the hormonal disturbance present.[18]

At the present time, the theory of renal ischemia as a cause of human hypertension lacks convincing proof. Renal disease is a definite causative factor in rare instances, but is not the universal cause of the disorder, and renal ischemia is not obligatory to the hypertensive state. The cause and perpetuating mechanism of essential hypertension is unknown.[15] Obviously no treatment we have at present can act on the cause of the disorder. Our efforts are directed at relieving symptoms as they appear and at reducing the arterial tension which is the most easily measured manifestation of the disease.

Medical treatment will now be considered in terms of psychotherapy, diet and drug therapy.

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Read at the annual meeting of the Minnesota State Medical Association, June 30, 1947, at Duluth, Minnsota.

### Psychotherapy

Every physician has observed the fact that emotional and nervous reactions may elevate the blood pressure. Psychotherapy simply consists of helping the individual neutralize or diminish these reactions, and thereby produce a trend toward lower blood pressure levels. This type of therapy is particularly suitable because most hypertensive individuals are burdened with more than their rightful share of nervous reactions.

A study of the personality from the psychologic standpoint has been made by Binger.[8] His results, based on a study of twenty patients, show that "the hypertensive individual has a neurotic personality disorder, manifested in interpersonal relationship, in sexual adjustments and occupational achievements. He is characteristically tense and given to states of anxiety and depression. Much of this emotional tension can be ascribed to inhibited, but not deeply repressed, aggressive impulses." This neurosis, no doubt, explains in part many of the symptoms of the disorder, such as headaches, palpitation, weakness, shortness of breath, dizziness, et cetera, and provides a fertile field for psychologic reorientation. Simple psychotherapy may be very beneficial in relieving symptoms, if skillfully applied; in more profound states the aid of the psychiatrist must be sought. Weiss, a psychiatrist who has treated many of these patients, states that "almost every patient can be benefited by psychotherapy."

Tact is of the essence in handling these patients, and the power of the spoken word must be fully appreciated by the physician. When, after the careful evaluation of repeated readings, it is concluded that hypertension exists, a frank discussion of the subject with the patient should be undertaken immediately. This provides an immediate basis of understanding which will encourage the patient to seek advice from the physician in the future rather than from well-wishing friends. At this interview the prognosis should be discussed, and the patient should be reassured that the living out of a normal life span is possible. The normal variability of blood pressure readings should be explained.

In discussing level of blood pressure, it is wise to avoid absolute figures, but rather to speak of a blood pressure tendency toward elevation or depression. It is also good practice to avoid mentioning medicines which will bring "the blood pressure down"; medicines should be prescribed for the disease as a whole. In order to combat the common fear that high blood pressure will cause arteries to "blow out," it can be stated that healthy arteries will stand a pressure not only of 300 mm. but as high as 2,000 mm. of mercury.[4] Return visits should be encouraged, and actual blood pressure determinations eliminated from as many of these visits as possible.

In addition to the proper psychologic orientation of the patient, the benefits of a sensible regimen of rest and relaxation should be emphasized. Enforced bed rest is seldom necessary. Prolonged bed rest may lead to invalidism even though it results in lowering of the blood pressure, and should be avoided. In regard to exercise, one need only remember that moderate exercise is another way of producing relaxation and easing nervous tension. It also increases the caloric expenditure and therefore may benefit the obese patient.

### Diet Therapy

Of various diets proposed for the treatment of hypertension, the reduction diet has the greatest usefulness, for many of these patients are obese. This diet has no permanent or transient effect upon the blood pressure, but by decreasing the body weight it does decrease the strain on the heart, and in this way prevents cardiac failure. The low-salt diet has had time-honored recognition, but its actual vasodepressive effect is doubtful. Recently, Grollman[6] has produced a decrease in blood pressure with a diet of rigid sodium restriction. However, the careful measurement and special processing of food required precludes its general use. The rice diet of Kempner[9,10] has aroused much interest. It is composed mainly of rice, fruit and sugar, with a low sodium and low protein content. This diet is monotonous and unpalatable and has not had widespread acceptance.

### Smoking

What advice should be given the patient in regard to smoking? It is well known that smoking causes a decrease in peripheral blood flow and an increase in the blood pressure and heart rate in normal young persons. It has further been found that in young hypertensive individuals and in older hypertensives with vascular disease, there is a trend towards decreased peripheral blood flow with increased heart rate and blood pressure after smoking.[16,17] It would appear, therefore, that smoking cigarettes has a deleterious influence on

the vascular disturbance in the hypertensive individual, and probably should be eliminated.

### Drug Therapy

A survey of the use of drugs in the treatment of hypertension merely serves to re-emphasize the fact that a substance, easily administered, with a prolonged hypotensive action and without toxic effect, is yet to be found. Nitrites, iodides, veratrum,[8] kidney extract, hormones and vitamins are of no proved value.[1] The action of Etamon (tetraethyl ammonium chloride), a powerful vasodepressor, is too fleeting and would not seem to qualify as a suitable drug. The results from irradiation of the pituitary gland need further confirmation[13] The sedatives are very useful for the relief of symptoms but their prolonged use should be guarded against. They have no sustained effect on the blood pressure.

Potassium thiocyanate has been used widely in this country since Barker in 1936 introduced a method of blood assay which greatly facilitated the control of dosage. However, even after ten years of extensive trial the value of this drug and the indications for its use are not agreed on.[7] It appears to be effective in lowering the blood pressure and relieving syptoms in hypertension. A sustained fall in blood pressure can be expected in about 43 per cent of the patients to whom it is administered and complete symptomatic relief in 50 per cent.[2,5,19] It is especially beneficial in relieving severe headaches and dizziness. A disadvantage of thiocyanate therapy is the close observation of the patient which is necessary in order that the dosage and blood concentration be kept satisfactory. This requires repeated venous blood determinations throughout the course of treatment. Mild toxic effects occur in 20 per cent of the patients but usually do not require discontinuance of the drug. The dosage varies considerably in different individuals. The drug is contraindicated in renal insufficiency, extensive cardiac or cerebrovascular arteriosclerosis and in malignant hypertension. It does not relieve the anginal syndrome or exertional dyspnea seen in hypertension. It also appears to have no effect in retarding the atherosclerotic process or in diminishing the organic failure resulting therefrom.

Two methods of administration are used. White[21] recommends beginning with 3 grains daily, checking the blood level at the end of two weeks, then increasing the dose by 1 to 3 grains daily, until a satisfactory fall in blood pressure occurs. At this point a maintenance dose is established. The patient must, of course, be continuously observed for toxic effects. He has found that good results occur with blood levels as low as 4 to 7 mg. per cent and with doses as varied as 3 to even 15 grains daily. If a two months' trial is not effective, the therapy should be discontinued. Hines[7] advises an initial daily dose of 12 grains and subsequent dosage adjusted to maintain a blood level of 8 to 12 mg. per cent. His maintenance dose usually varies between 6 and 9 grains. A concentration test should be made every week until a maintenance dose is determined. Even on a maintenance dose, the level should be determined every two or three months. This drug is most suitable for use in patients below the age of fifty with little or no evidence of arteriosclerosis, and with symptoms, especially severe headaches.

Finally, a word about the patient in the geriatric age. The patient over sixty with hypertension but little focal arteriosclerosis and minimal symptoms is in a very favorable position. He needs no treatment whatever for his hypertension. Many fall into this group. Most individuals, however, are not so fortunate and have some degree of arteriosclerotic organ involvement by this time. We can do relatively little to head off impending cerebrovascular or renal failure, but by periodic attention to cardiac function, early heart failure can be recognized and effectively treated with digitalis and diuretics.

In summary, the medical management of hypertension involves, in order of importance, the use of psychotherapy, drugs and diet. It is essentially a conservative treatment in view of the unknown pathogenesis of the disorder. Our aim should be to treat the patient and the disease as a whole, not just the blood pressure level.

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# HYPERTENSION—SURGICAL TREATMENT

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A NUMBER of considerations have stimulated renewed interest in the treatment of essential hypertension by means of operations on the sympathetic nervous system. Chief among these has been a growing awareness of the prominent role played by hypertension as a cause of invalidism and death. Hypertension is being recognized as a killer even more malignant than cancer. The discovery of numbers of men with hypertension in the armed services has focused attention on the problem of the treatment of hypertension in young adults. Medical measures of treatment have proved inadequate and impractical in many cases. The hoped-for anti-pressor substance is not yet available, and regimens emphasizing rest and inactivity are not accepted by many patients. Finally, the development of more effective surgical techniques has given new hope to those hypertensives falling within their scope.

## Surgical Techniques

The surgical treatment of essential hypertension is based upon the assumption that vasoconstriction of neurogenic origin is an important factor in the production and maintenance of the elevated blood pressure. The object of surgery is to denervate a large portion of the vascular bed, particularly in the splanchnic area, together with the kidneys and adrenal glands.

A member of this society, Dr. Adson, enjoys the distinction of being the first surgeon to attack this problem. In 1925 he and Rowntree reported the case of a patient upon whom bilateral removal of the lumbar sympathetic trunks was performed in an unsuccessful effort to relieve malignant hypertension. Believing that a more complete denervation was required to produce a satisfactory result, Adson subsequently carried out a more extensive procedure, the sectioning of the anterior (motor) spinal nerve roots from the sixth thoracic to the second lumbar levels. This operation required an extensive laminectomy and carried a definite risk of spinal cord trauma. For this reason it was eventually abandoned, but not before it had been conclusively demonstrated that the blood pressure could be significantly and permanently lowered in cases of severe hypertension, and that such lowering of the blood pressure was not, as some had postulated, harmful to the patient.

Following the suggestions of Italian surgeons, the next attack was upon the splanchnic nerves and the adjacent portions of the sympathetic trunk. Craig and Adson removed these structures just below the diaphragm through a retroperitoneal exposure. This operation was relatively simple of performance and carried an amazingly low mortality. However, its results were disappointing except in mild cases, and it was gradually abandoned.

Peet (1933) at the University of Michigan removed segments of the splanchnic nerves and sympathetic trunks just above the diaphragm, gaining exposure by removal of portions of the eleventh ribs. This operation, which has now been performed on over 1,500 patients in Peet's clinic alone, carried a somewhat greater risk than the Craig-Adson operation, but it was also more effective.

In an effort to achieve a still larger percentage of favorable results, Smithwick (1938) devised a more extensive operation which was essentially a combination of the Craig-Adson and the Peet techniques. Through an incision extending from above the tenth rib into the flank, the splanchnic nerves are removed from the ninth thoracic level to their termination in the celiac ganglion, and the sympathetic trunk is removed from the ninth thoracic to the second lumbar levels. The procedure is carried out bilaterally, at an interval of about eight to ten days. This thoraco-lumbar sympathectomy is at present the standard operative procedure employed in the treatment of hypertension. It is more effective than the less extensive operations, yet it has a mortality in expert hands of only about 1 per cent (case mortality 2 per cent). It does have a not insignificant morbidity, however, as approximately a month's hospitalization is required for preoperative tests and the two operations, and postoperative discomfort from nerve irritation is considerable in many patients.

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Even more extensive sympathectomies have been carried out by Grimson (1941) and Poppen (1942). It is not yet apparent if they yield results which are sufficiently superior to justify the additional risk and effort which they entail.

### Results of Operation

It has been a common observation that the result of operation in an individual case is difficult to predict and subject to wide variation. Only by the study of large groups of cases followed for several years postoperatively, and a comparison of their course with that of similar groups of patients treated medically, can a true estimate of the worth of these operations be obtained. Fortunately, a number of such reports by both medical and surgical observers are available, some of them extending over as long a follow-up period as twelve years. The reader is referred to the original papers for statistical details. Comparisons between the reports of different authors is difficult because of the varying standards adopted for the selection of cases for operation and for the evaluation of results. It is clear from a study of these reports, however, that while surgery is seldom to be regarded as a cure for hypertension, it does yield results for certain groups of patients which are decidedly superior to those produced by medical treatment.

The beneficial results of operation in successful cases may be considered under three headings:

*Subjective Symptoms.*—It has been a universal observation that subjective symptoms such as headache, dizziness, palpitation and a feeling of "inner tension" are dramatically relieved in a high percentage of cases, including many in whom there is litt'e or no lowering of the blood pressure. This has been attributed to denervation of the adrenal glands. These results, while admittedly subjective, are frequently very gratifying to the patient, particularly when they permit him to return to a gainful occupation. Relief from severe and disabling headaches is particularly welcome.

*Objective Findings.*—Chief interest attaches to the effect of operation upon the blood pressure level, and this tends to become the sole criterion by which the result of operation is judged. For purposes of comparison both preoperative and postoperative pressures should be determined under similar circumstances, preferably after a period of bed rest, and pressures should be compared in both the recumbent, sitting and standing postures. It is manifestly unfair to compare a preoperative reading obtained after a period of rest with a postoperative reading obtained in the physician's office.

During the first weeks following operation many patients display a marked orthostatic hypotension. Assumption of the erect posture is followed by a precipitous fall of blood pressure together with palpitation, giddiness, and even syncope. It may be necessary for the patient to wear a snug abdominal binder and even to wrap the legs with elastic bandages in order to stand up. These effects tend to wear off in the course of a month or two, but some fall of blood pressure on assumption of erect posture may persist indefinitely. A number of patients will demonstrate a fall of blood pressure on exercise postoperatively rather than the normally encountered rise.

Three recent follow-up reports demonstrate the beneficial effect of operation on blood pressure levels. Peet, reporting on 437 cases followed for from five to twelve years after operation, found that 46.7 per cent showed a significant reduction in blood pressure at (least 40 mm. systolic and 15 mm. diastolic). Among patients still living, 81.3 per cent showed a significant reduction. It may be mentioned that Peet's patients included a relatively large number with advanced and malignant hypertension. The results were naturally superior in those with milder forms of the disease.

Poppen, reporting on 100 consecutive patients subjected to an extensive sympathectomy and followed for one and a half to four years, found that 47 per cent had good results, i.e., a reduction of blood pressure to nondangerous levels, and relief of symptoms, the patient being in good physical condition. An additional 24 per cent of patients had a fair result, i.e., they were relieved of symptoms, were in good health, but had experienced a lesser fall in blood pressure although all pressures were in a range regarded as relatively nondangerous. A satisfactory result was obtained in 71 per cent of patients.

Palmer, reporting on a group of Smithwick's patients, found that whereas early in their postoperative course two-thirds of the patients had blood pressures which were normal or nearly normal, at the end of three years only 25 per cent maintained this level. However, a similar

group of patients treated medically with thiocyanates yielded only one-half as many favorable results.

These three reports are not comparable one with the other because the types of cases treated and the criteria for judging results vary among them, but they all demonstrate the effectiveness of surgical treatment and its superiority over medical management.

Objective improvement is not limited to blood pressure levels alone. Improvement in funduscopic findings, with disappearance of hemorrhages, exudates and edema has been frequently observed following operation, whereas such an occurrence is rare indeed under medical treatment. Localized angiospastic changes frequently are observed to disappear; sclerotic changes, of course, are permanent.

A significant percentage of patients noted to have enlarged hearts and electrocardiographic changes preoperatively show a return of such findings to or towards normal. However, patients presenting actual hypertension heart disease with congestive heart failure are not often benefited.

Careful rechecks of kidney function have demonstrated that most patients presenting normal or nearly normal findings preoperatively will maintain their level of kidney function for long periods postoperatively, and some show improvement. But those patients in whom actual nitrogen retention in the blood was present preoperatively are seldom benefited by surgery.

*Longevity.*—Perhaps the best demonstration of the efficacy of surgery in the treatment of hypertension is provided by studies of mortality rates in comparable groups of patients under medical and surgical management. The statistics of Keith and Wagener provide the best available standard against which to test the results of surgical treatment. Peet has presented such a comparison. His statistics show that whereas only 60 per cent of those with mild (Group I) hypertension survived for five years under medical management, 100 per cent of such patients subjected to operation lived a similar time. Among patients presenting evidence of more advanced hypertensive disease with organic changes in the blood vessels, heart and kidneys (Group II), the advantage in favor of the group operated upon was much less striking. Greatest interest attaches, however, to patients with malignant hypertension (Group IV), that is, those who present evidence of retinal edema together with a rapidly progressive hypertension. Under medical management 79 per cent of such patients die within a year and 99 per cent within five years. Longevity following operation is strikingly increased; 19 per cent of 112 patients with malignant hypertension operated upon by Peet were alive at the end of five years.

Palmer has also emphasized the good results to be obtained in cases of malignant hypertension subjected to operation before the onset of renal and cardiac failure.

### Selection of Patients for Operation

The judicious selection of hypertensive patients for surgical treatment involves both scientific and humanitarian considerations. Adherence to too strict standards will permit the compilation of an enviable set of statistics, but will exclude many borderline patients who, facing inevitable disaster, will be denied their chance for help. Adoption of too liberal a policy, on the other hand, will yield so many poor results that the reputation of the surgical method will suffer and patients will be sujected to needless inconvenience and expense.

A review of the literature shows a considerable diversity of preoperative criteria for the selection of patients. Attempts to set up tests, usually relating to the behavior of the blood pressure under various conditions of stimulation and sedation, have not been too successful in predicting favorable responses to operation. On the other hand, certain indications of a probable poor result have been discovered and these appear to be much more consistent. Thus the process of case selection is largely one of exclusion.

It is, of course, assumed that in the patient under consideration other causes of arterial hypertension, such as unilateral kidney disease and pheochromocytoma, have been excluded.

Most authors find that patients in the younger age groups, presumably having less vascular sclerosis, are more favorable subjects. The optimum age for operation is below forty years, and rarely is there occasion for operating on patients over fifty. Females are notoriously more tolerant of hypertension than males, and as a group they yield better results following operation.

A family history of hypertension, with a record of parents and close relatives dying as young adults of strokes, Bright's disease, or conges-

tive heart failure, should certainly dispose one toward advising operation at as early an age as possible in patients showing unmistakable evidence of progressive hypertension. If operation on a purely prophylactic basis is ever justified, it is in this group.

The preoperative study of the patient's blood pressure should be carried out over a period of time and under varying conditions of activity and rest. Smithwick has particularly emphasized the difficulties of estimating the true state of the patient's blood pressure from single examinations, particularly those performed in the doctor's office, since these usually represent maximum readings. It should be demonstrated that the patient has a persistent elevation of blood pressure and that it is progressively becoming higher in spite of medical management.

The lability of the blood pressure may be checked by recording hourly readings over a twenty-four to forty-eight-hour period of bed rest, and by similar hourly recordings after heavy sedation (sodium amytal gr. 3, hourly for three hours). A labile blood pressure is no guarantee of a good result following operation, but a relatively fixed blood pressure practically excludes it. Smithwick has found that when the pulse pressure, determined at rest, is less than one-half the diastolic pressure, the prognosis for improvement is good, while if the pulse pressure approaches or exceeds the diastolic, the chances for success are poor.

Careful study of the patient's fundi is most important for it provides an estimate of the degree of arteriolar sclerosis present. Observable also may be evidences of active vasospasm and retinal edema. The latter indicates that the case is one of malignant hypertension.

Study of the heart size and function, electrocardiography, and careful tests of kidney function are essential to exclude unsuitable cases. As previously indicated, patients with congestive heart failure and nitrogen retention in the blood seldom obtain worth-while results. Evidence of more than minimal coronary artery disease in the electrocardiogram should exclude the patient since coronary closure accounts for most of the few operative fatalities.

A history of cerebrovascular accident, if not in itself disabling, is no contraindication to operation, provided the patient is otherwise suitable.

### *Contraindications for Surgery*

1. Mild, nonprogressive hypertension.
2. Age over fifty years.
3. Fixed blood pressure level with a high pulse pressure.
4. Nitrogen retention in the blood.
5. Coronary artery disease.
6. Congestive heart failure.

### *Indications for Surgery*

1. Progressive, labile essential hypertension in a patient under forty years of age, without evidence of important organic changes in the blood vessels, heart, or kidneys, especially in the presence of disabling subjective symptoms and/or a family history of early hypertensive deaths.
2. Early malignant hypertension, before the onset of renal and cardiac failure.

## Conclusion

Surgery in the form of thoracolumbar sympathectomy is the best available treatment for some patients with essential hypertension. Properly applied, it is a safe and effective method which will alleviate symptoms and prolong life. It is not a last resort or a measure of desperation and should be offered to the patient while he is still in a condition to obtain its full benefits.

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There is no short cut to a new thing. It must be preceded by long, tedious hours of experimentation and scores of disappointments. The only time you cannot afford to fail is the last time you try.—CHARLES F. KETTERING.

# ABDOMINAL EMERGENCIES IN GENERAL PRACTICE

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IN this paper only a few of the acute abdominal emergencies will be discussed. The need of the physician to develop an awareness of the possibilities of the symptoms of continued abdominal pain is evident. The presence of abdominal pain associated with nausea and vomiting which has been present for six hours or longer must be considered as evidence of a serious lesion of the abdomen and one which in most instances requires surgical interference.[5] One cannot see such patient and promise to return later. The responsibility for the care and recovery of the patient is definitely in the hands of the physician who first sees him. The care of these patients will constitute about 10 per cent of all general major surgery in the average rural hospital.

A brief report of such patients seen in Bethesda and St. Vincent's hospitals in Crookston may be descriptive of those seen in similar hospitals throughout the state. Both hospitals are approved by the American College of Surgeons; both are fifty-bed hospitals, but each has been caring for up to eighty patients per day recently; both have excellent laboratories; and the same men are on the staffs of both hospitals. There is a trained and resident anesthetist in each hospital. The cases here reported were cared for by the members of the staffs of both hospitals.

During the two years 1945 and 1946, 8,151 patients were cared for, exclusive of newborn. There were 1,324 major operations, of which 135 were acute abdominal emergencies. Of these, 104 were acute appendicitis, of which sixteen were perforated. There were five cases of perforated peptic ulcer; seven cases of ruptured tubal pregnancy; two cases of intussusception; five cases of intestinal obstruction and twelve cases of other diagnosed conditions. There was no death among the appendicitis cases.

The physician who is called to see a patient with symptoms indicating an acute abdominal emergency is faced with a most tremendous responsibility, as the life of the patient is entirely in his hands. An attempt at early diagnosis must be made, and once the diagnosis has been made, early operation is mandatory. If a diagnosis is not immediately possible, the attending physician should not hesitate to ask for consultation and to take his patient to the nearest hospital where laboratory facilities are available. If it is evident that he is dealing with an acute abdominal condition, early operation should be done without spending valuable time in confirming or rejecting a tentative diagnosis. An exploratory laparotomy will carry little risk, while delay will result in a high mortality. These cases require quick thinking and sound judgment, as the mortality rate varies directly with the delay in operation.

In dealing with these emergencies, one's first concern should be the saving of the patient's life, doing a minimal amount of surgery and planning a secondary operation later if necessary. The physician should avail himself of every possible therapeutic agent. Most of these patients are first seen by a general practitioner who will have hospital facilities available at a short distance. Many of these patients will undergo operation at the hands of a general surgeon, especially in the rural areas.

The physician is usually called in these cases because of the patient's complaint of severe abdominal pain. At present, hospital facilities are within a short distance of the patient by automobile or ambulance, and he should be given the added advantage that early hospitalization gives him. An early attempt should be made to eliminate the question of medical conditions simulating surgical disease. Here again, pain may be the principal or only complaint, and this will bring to mind the acute abdominal symptoms arising from such conditions as pleurisy, pneumonia, coronary disease, spinal nerve pain, diabetic conditions and others. After it has been decided that the pain is really due to some acute abdominal condition, the attempt to make a differential diagnosis should be made. One will remember that most acute abdominal conditions will arise from (1) inflammation, (2) obstruction, (3) perforation, or (4) hemorrhage.

Improvement in mortality rates in the surgical care of these patients has been outstanding in the last ten or fifteen years. This is due not so much

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to improved surgical technique as to better preoperative and postoperative care; improvement in general anesthesia (gas with curare and sodium pentothal); better spinal anesthesias; the more frequent use of transfusions, whole blood or plasma, preoperative and postoperative; the use of sulfa drugs and penicillin; and early ambulation. Wangensteen suction with either a Levine or a Miller-Abbott tube has saved lives; amino acid therapy promises to save additional ones. Surgical technique as applied to acute abdominal emergencies has not changed much in the last ten years.

In the past the surgeon devoted much attention to perfecting surgical technique, assuming that if an operation was well done the patient should be assured of recovery. It is now well established that while careful technique is essential it is only one of the factors which will enter into the problem of making the patient's chances of recovery better. Other factors include the correction of deficiencies due to diet or disease or vomiting. This may be done by intravenous therapy in most instances, as the case is an emergency, and will consist of the administration of water, blood and plasma, glucose, and other substances including electrolytes and vitamins.[2]

Trauma will be diagnosed early because of history of accident or because of wounds of the abdomen. Such abdominal wounds may be penetrating or nonpenetrating; the latter cases cause some diagnostic difficulty. Treatment usually consists of suturing the small intestine with no drainage in early cases and doing an exteriorization of the large bowel. It is the continual leakage of fecal contents that makes such wounds dangerous, while small punctures will often heal spontaneously. Patients seen late are often better treated expectantly with the hope that perforations and other trauma may be finally well walled off. Lacerations of solid organs will be looked for.[6]

Appendicitis remains the greatest single cause of abdominal emergencies, and appendectomies will constitute 50 to 70 per cent of all operations for acute abdominal conditions. Appendicitis is typical of the inflammatory type of acute abdominal conditions. In the last thirty years this disease caused the deaths of 500,000 persons—a sizable army.[4] The New York Life Insurance Company reported that of one thousand deaths of policyholders in 1937 fifteen were due to appendicitis. Abell reported 20,000 deaths in 1940. Any disease which causes so many deaths is deserving of study. The development of the present era of surgery can nowhere be better demonstrated than in the treatment of acute appendicitis. It is believed that recent trends will mean a rapid lowering of mortality rate.

In the last twenty years four major contributions to surgery have been applied to the treatment of acute appendicitis. These are (1) intragastric suction, (2) intravenous fluids, (3) whole blood and plasma transfusions, and (4) chemotherapy and antibiotic therapy. Early ambulation might be added. This has reduced the mortality rate in the presence of perforation by 50 per cent. There has been a much less spectacular reduction of mortality in cases without perforation.[7]

The question of whether or not to drain has been discussed very much in the past. It appears that drainage of the peritoneal cavity for appendiceal peritonitis carries a very high mortality as compared to the case which is not drained. The same is true of appendiceal abscess where the better treatment is removal of the appendix where possible, closure of the peritoneum, and drainage to the peritoneum. Postoperative complications will be much less.

Perforated peptic ulcers are relatively common. Pain is the initial symptom and is so intense that it completely incapacitates the patient at once. The history of sudden onset, perhaps a past history of "indigestion," and the boardlike abdomen with evident great pain should cause the examiner to be on the alert for this condition. The patient who is seen two to four hours later may have confusing symptoms in that he may feel better and the rigidity may be less. It is at this stage of the disease that mistakes in diagnosis are common.

Graham's trinity of signs and symptoms indicative of intraperitoneal irritation apply to perforated peptic ulcer cases: (1) pain and tenderness; (2) one point of maximum tenderness; (3) it hurts the patient to roll over in bed. When the added symptom of rebound tenderness is present, the condition demands a laparotomy.[3,11] Surprisingly, cultures are frequently negative and peritoneal infection is not always present in fatal cases, but not many surgeons at present will follow Taylor[8] and others in treating these cases medically with suction, et cetera. Operation is indicated as early as possible. Here again, time

should be taken for careful preparation of the patient, and suction preoperatively and postoperatively may be life saving.

Black and Blackford[1] advise early but conservative operation for perforated peptic ulcer. Drainage is not necessary if operation is done in the first six to eight hours. After twenty-four hours or more they state that conservative nonsurgical treatment with continuous nasal suction may be the best possible. Vaughn[9] feels that if the patient is seen twenty-four or more hours after perforation, operative interference may lessen chances for recovery by breaking down adhesions which have closed the perforation, and that continuous nasal suction may be the best treatment. Wangensteen[10] in 1935 used suction in perforated ulcer cases when operation was not done.

Obstruction of the bowel is characterized by a colicky type of pain with comparative rest periods between cramps. The abdomen is noisy in the early case and this is characteristic. Perhaps the outstanding symptom here is the persistent vomiting in small bowel obstruction, differing from that of appendicitis where the patient vomits only a few times if at all. Surgery in these cases is imperative and prognosis will be better with careful preoperative treatment of shock and loss of fluids. A "must" in these cases is Wangensteen suction by a Levine or Miller-Abbott tube.

Hemorrhage as a cause of acute abdominal emergencies is well represented by the case of ruptured ectopic pregnancy. Other causes of abdominal hemorrhage are perforating wounds, and a rare cause is that of bleeding from cyst of the ovary. Shock in these cases may indicate excessive hemorrhage, and if shock does not improve with preoperative therapy the patient will have to be operated upon during shock, whole blood being given during the operation. Following abdominal trauma there may be profuse hemorrhage from an injured liver, spleen or mesentery. Bleeding from a spleen requires its removal while laceration of the liver may be best treated by suture or tamponade. Some patients with bleeding will have to be operated upon in shock and the mortality will of necessity be high.

The unusual case will cause the attending physician more worry, in that symptoms sometimes do not follow the usual pattern or closely parallel the symptoms of some of the more usual conditions. This will mean mistaken diagnoses fairly often, but with the history and symptoms of an acute emergency, exploration will be life saving.

The patient with acute abdominal symptoms should call a physician early. Early hospitalization and early operation should be the rule.

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## HYPERTENSION—MEDICAL TREATMENT

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# BOWEL OBSTRUCTION

## An Analysis of 148 Cases

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IT would be fitting and proper in presenting a study on this subject to review briefly the salient factors which recently have come to our attention. The management of bowel obstruction successfully depends on the rational combination of non-operative and operative treatment.

All of us are aware of the desperate plight in which the individual who has a bowel obstruction finds himself. Our responsibility to him is urgent. It is important that we be able to decide on prompt, specific treatment and to recognize the moment when surgical intervention is indicated. The importance of the combination of non-operative and operative treatment cannot be emphasized too much.

Veal has summarized the mass of available data on acute bowel obstruction very nicely by saying, "The local lesion consists of distention of the bowel, alteration in its secretory and absorptive function, impairment of local circulation, and eventually gangrene of the involved segment of the intestine. The metabolic disturbance consists chiefly of loss of water, electrolytes, plasma, retention of nonprotein nitrogen and urea."

In the chronic type of low bowel obstruction, malignant neoplasms have been present so frequently that we automatically associate them. The metabolic changes are, of course, much slower in appearing, and the toxicity of the patient is much less in this type. More deliberate planning therefore may be used in choosing the method of relief to the individual.

We must expedite the treatment as soon as the diagnosis is made. Wagensteen and Paine, who made practical the decompression of the stomach and upper digestive tract by nasal suction, also have shown that it is one of our best procedures in the treatment of bowel obstruction. Finney emphasizes that this decompression be maintained both during and following operation.

Dehydration completely upsets the normal metabolism of the body so that death ensues if steps are not taken to combat it. A rapid loss of fluids from the body causing dehydration results when vomiting occurs, when there is loss of fluid into the peritoneal cavity, and when there is a disturbance in the secretory and absorptive mechanism of the bowel. This dehydration causes a fall in blood chlorides, a rise in nonprotein nitrogen, and an increase in the carbon dioxide content of the blood.

Much work has been done by Coller, Maddock, and their associates at Ann Arbor on the "electrolyte balance" of the body. They have shown that in the patient who cannot drink enough, fluid in the form of 5 or 10 per cent glucose in distilled water can be given parenterally. The body handles this fluid as though it were taken by mouth. The water becomes available for all purposes, and the glucose is either oxidized or stored as glycogen. The blood chlorides can easily be replaced by the parenteral administration of saline. Caution must be used as over-concentration of chlorides may be dangerous. DeWesselow has pointed out that a proper balance cannot always be determined by laboratory blood chloride determinations but that the clinical picture of the patient is important. The judicial replacement of fluids, electrolytes, and proteins therefore may be life saving in the management of bowel obstruction.

An adequate urinary output is essential. Wangensteen, White, Sweet, and Hurwitt all advocate a minimum output of at least 1,000 c.c. daily, although the seriously ill patient may require an output of 1,500 c.c. of urine in twenty-four hours. Coller recommends that no isotonic saline solution or Ringer's solution be given during the day of operation or during the subsequent two postoperative days. Isotonic or Ringer's solution may then be used after the postoperative urinary suppression has disappeared.

The kidneys are important regulators of the salt balance of the body and have been known to excrete as high as a 2 per cent concentration of salt in the urine; however, in low salt concentration of the body, only traces of salt may be found. The normal amount of salt in the body is 560 to 630 mg. per 100 c.c. of blood as determined by the blood plasma chloride concentration. The

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ability of the average surgical patient to handle salt is about the same as a well individual. The case is entirely different in the sick surgical patient; here the ease with which the kidney retains salt in the body increases.

The seriously ill patient loses salt by vomiting, nasal suction, prolonged sweating, diarrhea; and there is no replacement when there is no intake of food or water. It should be re-emphasized, however, that caution must be used not to overdo the replacement of salt in the seriously ill patient.

Recently the loss of plasma proteins has been a subject of much investigation. This loss is more important and apparent in the person with a chronic bowel obstruction. Previously, whole blood and plasma were our only available supply of protein. Now, several available commercial preparations like "amigen" contain all the necessary amino acids.

The management of the acutely ill patient with bowel obstruction presents different problems. The stomach and upper gastrointestinal tract must be decompressed with nasal suction. The replacement of fluids, salt, and protein is essential; and the determination of the amount necessary will depend on the time elapsed since the onset of symptoms, the level of the obstruction (whether high or low) and the amount of vomiting. Finney emphatically states that if colicky pains continue after decompression of the stomach and there has been time for even partial restoration of the fluid and electrolyte balance, immediate surgical exploration is mandatory. He also states that the average patient should be given in a twenty-four hour period a minimum of 3,000 c.c. of water, 5 gm. of electrolyte, 150 glucose, and 50 gm. protein. This should keep the patient in the proper balance.

The cases presented in this study of bowel obstruction are from Fairview Hospital during the years 1931 to 1947, and 148 consecutive cases are included in this sixteen-year period.

It has been difficult in some cases to evaluate the information available as to the actual existence of a bowel obstruction. It was decided that if the bowel obstruction was severe enough to warrant specific relief, it could be included in this series. No effort has been made actually to differentiate between a partial and complete obstruction. As a rule, however, most of the high obstructions were complete; and the low obstructions varied from partial to complete. Most of the obstructions due to malignancy were diagnosed beforehand and came to the attention of the physician because of bowel disturbances, bleeding, or change of bowel function. However, there were some patients who did not seek relief until the obstruction became complete.

TABLE I. TYPES OF OBSTRUCTION

| | |
|---|---|
| Mechanical (Adhesions) | 30 |
| Inguinal Hernia | 16 |
| Volvulus | 5 |
| Postoperative Ventral Hernia | 4 |
| Intussusception | 4 |
| Foreign Body | 3 |
| Femoral Hernia | 2 |
| Umbilical Hernia | 2 |
| Benign Tumor (Recto-Sigmoid) | 1 |
| Mesenteric Thrombosis | 1 |
| Meckel's Diverticulum | 1 |
| Diverticulitis | 1 |
| Carcinoma of Sigmoid | 29 |
| Carcinoma of Transverse Colon | 12 |
| Carcinoma of Recto-Sigmoid | 11 |
| Carcinoma of Cecum | 10 |
| Carcinoma of Descending Colon | 5 |
| Carcinoma of Ascending Colon | 4 |
| Carcinoma of Splenic Flexure | 1 |
| Carcinoma of Hepatic Flexure | 1 |
| Carcinoma of Duodenum | 1 |
| Carcinoma of Jejunum | 1 |
| Carcinoma of Ileum | 1 |

In reviewing these cases, it is convincing that our high mortality in bowel obstruction is due in part to the tardiness of the patient in seeking relief. Many of these individuals were very acutely ill on admission, some of them even approaching the moribund stage. Operative notes revealed resection of large pieces of gangrenous gut with an already established peritonitis.

The mechanical obstructions (Table I) constitute the largest group in this series, most of them caused by adhesions such as omental bands, inflammatory reactions and postoperative adhesions. There were thirty in this group.

It is surprising to find only sixteen obstructions due to inguinal hernia. We have heard it spoken of so frequently that we would expect more. Four were due to postoperative ventral hernia. Ventral and umbilical hernias each caused two obstructions, making twenty-four the total number of obstructions due to hernia. There were five obstructions due to volvulus. Intussusception caused four obstructions, three of which were reduced by operation and one by barium enema. There were three due to foreign bodies—a penny, a fecal impaction, and a large gallstone. Benign tumor of the rectosigmoid, mesenteric thrombosis, Meckel's diverticulum, and diverticulitis each caused one obstruction.

Of this series of 148 bowel obstructions, seventy-six were caused by malignancy. Most of these

TABLE II. OPERATIVE PROCEDURES

| | *No.* | *Deaths* |
|---|---|---|
| Reduction of Hernia | 18 | 1 |
| Reduction of Hernia with Resection | 2 | 2 |
| Liberation of Adhesions | 18 | 3 |
| Liberation of Adhesions with Resection | 2 | 2 |
| Reduction of Intussusception | 2 | 0 |
| Reduction of Intussusception with Resection | 1 | 0 |
| Reduction of Intussusception Nonsurgically | 1 | 0 |
| Reduction of Volvulus | 4 | 1 |
| Reduction of Volvulus with Resection | 2 | 1 |
| Ileo-colostomy | 17 | 5 |
| Ileostomy | 8 | 6 |
| Nonresectable | 3 | 3 |
| Colostomy | 26 | 4 |
| Exteriorization | 9 | 5 |
| Removal of Foreign Body | 2 | 2 |
| Primary Anastomosis | 9 | 3 |
| Anterior-Posterior Resection | 4 | 0 |

TABLE III. MORTALITY

| | Number of Cases | Deaths | Percentage |
|---|---|---|---|
| Total cases studied | 148 | 41 | 27 |
| Total cases operated | 130 | 35 | 26 |
| Cases not operated | 18 | 6 | 33 |
| Male | 60 | 19 | 31 |
| Female | 88 | 22 | 25 |
| High obstruction | 55 | 18 | 33 |
| Low obstruction | 93 | 23 | 24 |
| Acute obstruction | 77 | 26 | 33 |
| Chronic obstruction | 71 | 15 | 21 |
| Exploratory | 6 | 3 | 50 |

were partial but varied in degree from partial to complete obstruction. Carcinoma of the sigmoid was by far the most common malignant lesion, occurring in twenty-nine cases. We found twelve carcinomas of the transverse colon. Carcinoma of the rectosigmoid occurred in eleven cases. Carcinoma of the cecum was next, with ten cases. There were five carcinomas of the descending colon and four in the ascending colon. There was one obstruction due to carcinoma of each of the following: splenic flexure, hepatic flexure, duodenum, jejunum, and ileum. These diagnoses of cancer were made by microscopic examination of the specimen, autopsy, observation at operation and x-ray examination. It is interesting to note that there were only three cases of cancer of the small bowel, and these were in different portions of the small bowel.

The operative procedures (Table II) used in the treatment of the bowel obstruction varied with the type, acuteness, locality, and duration of the obstruction. Simple reduction was resorted to eighteen times, with one death. In the two patients in whom resection following reduction was necessary, both died, a mortality of 100 per cent. In the eighteen patients in whom adhesions were liberated there were three deaths. There were only four cases of intussusception. One of these was reduced by a barium enema and the others by operation. Of six patients with volvulus, the two who required resection died.

In the treatment of obstruction of the large bowel, it is of special interest to note the application of the recent trends in large bowel surgery. Primary anastomosis in selected cases with adequate preoperative preparation has been highly successful.

The most common procedure was colostomy. There were twenty-six colostomies performed with four deaths. Seventeen ileocolostomies were performed, both two-stage and one-stage; there were five deaths. There were nine primary anastomoses with three deaths, and there were nine exteriorizations with five deaths. There were four anterior-posterior resections done. These obstructions were in the rectosigmoid junction. There were no deaths. There were two foreign bodies removed with two deaths, a 100 per cent mortality.

Of the total number of 148 cases studied, there were forty-one deaths (Table III) or a mortality of 27 per cent. Among the 130 patients operated upon, there were thirty-five deaths, a mortality of 26 per cent.

Eighteen individuals were not operated upon. There were six deaths in this group with a mortality of 33 per cent. These were cases that were thought inoperable, others refused surgery, and some were sent elsewhere for operation. There were sixty males, with nineteen deaths—a mortality of 31 per cent, compared with eighty-eight females, with twenty-two deaths—a mortality of 25 per cent. There were fifty-five high obstructions with eighteen deaths, a mortality of 33 per cent. It was found that the mortality rate was the highest in this group in other hospitals also. There were ninety-three low obstructions with twenty-three deaths, a mortality of 24 per cent. There were seventy-seven acute obstructions with twenty-six deaths, a mortality of 33 per cent. There were seventy-one cases of chronic obstruction with fifteen deaths, a mortality of 21 per cent. There were six cases in which only an exploratory operation could be done, and there were three deaths, a mortality of 50 per cent.

A table of mortality in all obstructions in relation to age has been compiled (Table IV). We find that in the total number of 148 cases, the most deaths occurred in the fifty to sixty year age group. There were thirty-seven cases with six

deaths, a mortality of 16 per cent. The highest mortality was in the eighty to ninety year age group where six of the seven patients died, a mortality of 84 per cent. In the seventy to eighty year age group there were twenty-one cases with six deaths, a mortality of 28 per cent. In the sixty to seventy year age group there were thirty-three cases with ten deaths, a mortality of 30 per cent. In the forty to fifty year age group there were twenty-five cases with seven deaths, a mortality of 28 per cent. There were only nine cases in the thirty to forty year age group with three deaths, a mortality of 33 per cent. Six cases occurred in the twenty to thirty year age group with two deaths, a mortality of 33 per cent. There were two cases in the ten to twenty year age group with one death, a mortality of 50 per cent. In the age group under ten years of age there were seven cases with no deaths.

Table V is compiled to show the age group mortality in bowel obstruction due to malignancy. The sixty to seventy year age group had the most cases, there being twenty-two with six deaths, a mortality of 27 per cent. The fifty to sixty year age group was next, having twenty cases with three deaths, a mortality of 15 per cent. The forty to fifty year age group had sixteen cases with four deaths, a mortality of 25 per cent. The seventy to eighty year age group had twelve cases with four deaths, a mortality of 33 per cent. The eighty to ninety year age group had three cases with two deaths, a mortality of 66 per cent. The thirty to forty year age group had three cases with one death, a mortality of 33 per cent.

Table VI shows the mortality of bowel obstruction due to malignancy. In the seventy-six total cases due to malignancy, there were twenty deaths, a mortality of 28 per cent. There were seventy-two obstructions in the large bowel with nineteen deaths, a mortality of 27 per cent. There were three cases of obstruction due to malignancy of the small bowel with one death, a mortality of 33 per cent.

An attempt was made to tabulate the progress of bowel obstruction management over four four-year periods from 1931 through 1946 (Table VII). It was interesting to note that there was a definite increase in the number of cases for each four-year period.

In the first period (1931 to 1934), there were only twelve cases with five deaths, a mortality of 41 per cent. Of these, there were six cases of high acute obstruction with two deaths, a mortality of 33 per cent. There were two cases of low acute obstruction with no deaths. There were four cases of low chronic obstruction with three deaths, a mortality of 75 per cent.

In the next group (1935 to 1938), there were sixteen cases with five deaths, a mortality of 31 per cent. This is a decrease of 10 per cent in

TABLE IV. MORTALITY IN ALL BOWEL OBSTRUCTION
AGE COMPARISON

| Age Group | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| Cases | 7 | 21 | 33 | 37 | 25 | 9 | 6 | 2 | 7 |
| Deaths | 6 | 6 | 10 | 6 | 7 | 3 | 2 | 1 | 0 |
| Per cent | 85 | 28 | 30 | 16 | 28 | 33 | 33 | 50 | 0 |

TABLE V. MORTALITY IN BOWEL OBSTRUCTION
DUE TO MALIGNANCY
AGE COMPARISON

| Age Group | 80 | 70 | 60 | 50 | 40 | 30 | Total |
|---|---|---|---|---|---|---|---|
| Cases | 3 | 12 | 22 | 20 | 16 | 3 | 76 |
| Deaths | 2 | 4 | 6 | 3 | 4 | 1 | 20 |
| Per cent | 66 | 33 | 27 | 15 | 25 | 33 | 28 |

TABLE VI. MORTALITY IN BOWEL OBSTRUCTION
DUE TO MALIGNANCY

| | Cases | Deaths | Percentage |
|---|---|---|---|
| Malignancy | 76 | 20 | 28 |
| Large bowel | 72 | 19 | 27 |
| Small bowel | 3 | 1 | 33 |

TABLE VII. COMPARATIVE MORTALITY

| Four Year Periods | 1931-1934 | | | 1935-1938 | | | 1939-1942 | | | 1943-1946 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Case | Death | % | Case | Death | % | Case | Death | % | Case | Death | % |
| High acute | 6 | 2 | 33 | 3 | 3 | 100 | 17 | 5 | 30 | 31 | 9 | 29 |
| High chronic | | | | | | | 1 | 0 | 0 | 10 | 2 | 20 |
| Total | 6 | 2 | 33 | 3 | 3 | 100 | 18 | 5 | 27 | 41 | 11 | 26 |
| Low acute | 2 | 0 | 0 | 1 | 0 | 0 | 6 | 2 | 33 | 11 | 3 | 27 |
| Low chronic | 4 | 3 | 75 | 12 | 2 | 16 | 20 | 4 | 20 | 24 | 6 | 25 |
| Total | 6 | 3 | 50 | 13 | 2 | 15 | 26 | 6 | 23 | 35 | 9 | 25 |
| Total All Obstructions | 12 | 5 | 41 | 16 | 5 | 31 | 44 | 11 | 25 | 76 | 20 | 26 |

mortality from the previous period with an increase of four cases. Here there were three cases of high acute obstruction with three deaths, a mortality of 100 per cent. There was one low acute obstruction with no death and twelve low chronic obstructions with two deaths, a mortality of 16 per cent.

In the third period (1939 to 1942) there were forty-four cases, an increase of twenty-eight cases over the previous four years. There were eleven deaths, a mortality of 25 per cent, a decrease of 6 per cent. During this period the use of stomach and upper gastrointestinal decompression began; also the use of sulfonamides. There were seventeen high acute obstructions with five deaths, a mortality of 30 per cent; one high chronic obstruction with no death. There were six low acute obstructions with two deaths, a mortality of 33 per cent. There were twenty low chronic obstructions with four deaths, a mortality of 20 per cent.

In the last group, comprising the years 1943 to 1946, there was a total number of seventy-six cases with twenty deaths, a mortality of 26 per cent. This is approximately the same mortality as in the previous group. During this period, in addition to nasal suction and sulfonamides, we began the use of penicillin and streptomycin. There were thirty-one high acute obstructions with nine deaths, a mortality of 29 per cent. There were ten high chronic obstructions with two deaths, a mortality of 20 per cent. There were eleven low acute obstructions with three deaths, a mortality of 27 per cent. There were twenty-four low chronic obstructions with six deaths, a mortality of 25 per cent.

The very definite increase in the number of cases from group to group would indicate that we are recognizing these obstructions, especially those of a malignant nature. We are also recognizing the advance that modern surgery has made in successfully operating on patients we previously felt were inoperable.

The definite decrease in mortality in the last two periods is indicative of better treatment. The advancements of nasal suction, sulfonamides, streptomycin, whole blood transfusion, and supportive treatment have made surgical procedures possible at the present time which were not attempted previously.

In reviewing the literature, we find frequent references to high mortality occurring in bowel obstruction following operations for acute appendicitis. This was true in our series of cases also. We had eight cases of bowel obstruction following operation for acute appendicitis in which reoperation was required. There were five deaths, a mortality of 62 per cent.

It has been suggested that better results can be obtained if we treat these patients conservatively for a longer period of time, as some of them will not need to be operated upon if their symptoms subside under decompression of the upper gastrointestinal tract, parenteral therapy, and whole blood transfusion. We must bear in mind, however, that in these cases, should the symptoms persist in spite of adequate nonoperative treatment, surgical intervention is necessary.

## Summary

1. A total number of 148 consecutive cases of bowel obstruction at Fairview Hospital have been studied.

2. Of the 148 cases studied, there were forty-one deaths, a mortality of 27 per cent. Of the 130 patients operated upon, there were thirty-five deaths, a mortality of 26 per cent.

3. There was a definite decrease of mortality in each four-year period from 1931 through 1946.

4. The high mortality of bowel obstruction can be reduced by (a) the earlier presentation of the patient for treatment, (b) adequate non-operative treatment such as replacement of fluids, glucose, electrolytes, and proteins.

5. If colicky pains still persist in the abdomen after decompression of the stomach and upper gastrointestinal tract, immediate surgical exploration is mandatory.

6. Decompression of the stomach and upper intestinal tract should be established by nasal suction as soon as the diagnosis of bowel obstruction is made. This procedure should be carried on postoperatively until all distention disappears.

7. In addition to blood chemistry determination an accurate fluid intake and urinary output record is extremely valuable.

8. Defunctionalization and decompression of the colon in complete or partial obstruction of the left colon may be best accomplished by a transverse colostomy.

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## Discussion

IVAR SIVERTSEN, M.D.: I have enjoyed this paper very much. I do not know that I shall say a great deal about the subject. During Dr. Skjold's paper, I noted that not much was said about the use of nasal suction or the Miller-Abbott tube.

The mortality of this group of cases for Fairview Hospital has been more than average. It may be due to the fact that the patient has not been prepared before surgery, especially with the use of nasal suction or the use of the Miller-Abbott tube.

I have used the Miller-Abbott tube for some years, and in 1940 I suggested to Dr. Wangensteen that he try the use of mercury in the Miller-Abbott tube until it has passed into the duodenum. I had found it rather difficult to get it into the intestines on several occasions, but since I have used mercury in the bag of the tube, we have had less trouble. I have seen the tube pass through the gastrointestinal tract and appear in the anus when mercury was used. I also found that we can decompress the stomach with the ordinary nasal suction procedure and use the Miller-Abbott tube as well. Fluids intravenously, or subcutaneously, and transfusions of blood are certainly valuable in these cases. Preparation of the patient is most important. I think it was Dr. MacNealy who suggested the preparation of the patient very carefully with enemas, nasal suction, and even suggested small doses of mineral oil every day by mouth to soften the fecal matter in the bowel.

We must use all procedures that we can, and not only decompress the stomach but also the bowel. The patient will have to be watched carefully, and if pains continue after an effort has been made for decompression I think we had better depend on surgery to relieve the obstruction. I was just a little disappointed at the high percentage of deaths in our hospital, but hope they will decrease in the future.

O. J. CAMPBELL, M.D.: This is such an involved subject that it does not lend itself well to a brief discussion. I merely wish to compliment Dr. Skjold for undertaking this study and to suggest that it is a desirable type of study for each hospital staff to consider.

While the mortality rate which Dr. Skjold reports is high, I do not believe that it is excessively high for the period covered by the study and for the type of staff which did the operating, including as it does both trained surgeons and casual operators. Continued concern on the part of any hospital staff towards its operative results can hardly fail to influence favorably both the morbidity and mortality figures.

E. A. REGNIER, M.D.: I enjoyed hearing Dr. Skjold's paper. It takes a great deal of fortitude to critically review a large series of cases of intestinal obstruction. There seems to be a general impression that acute intestinal obstruction cannot be treated without the use of continuous aspiration of the stomach preoperatively. It is my opinion that in purely adhesive, nonmechanical obstruction occurring in the recently operated cases, one is justified in using nasal suction. However, in all cases of obvious mechanical obstruction and suspected strangulating obstruction, I do not believe nasal suction offers anything but delay in operating. A great many times this method of treatment is used in patients who have gone beyond the stage of peristaltic pain and have developed an ileus. This is apt to be most misleading. There is only one treatment for acute obstruction and that is immediate surgery. Operating on these cases should never be delayed beyond the few hours which may be necessary to rehabilitate the patient sufficiently with fluids or blood in order to render operation safe. The use of nasal suction needs a great deal of clarification before the profession, and I believe its misapplication is fraught with danger.

CLARENCE DENNIS, M.D.: I would like to say a little in support of what Dr. Regnier has said. I believe all of us agree that in the treatment of small intestinal obstructions, there is need to use nasal suction either with Dr. Wangensteen's tube or with the Miller-Abbott tube or some modification of it, but to treat small intestinal obstruction with suction and forget about the patient is a grave mistake. If conservative therapy is to be employed, one must be certain that strangulation is not occurring. The abdomen must be examined every four to five hours, white blood counts must be made every twelve hours, temperatures and pulses must be taken every four hours around the clock, and a number of other things must be done to detect the presence of strangulation early. If one is not in a position to watch the patient very closely throughout, it is better not to use conservative therapy for small bowel obstruction at all.

I am in agreement with Dr. Regnier that cessation of cramps cannot be taken as an indication that conservative therapy has been successful in the management of small bowel obstruction.

ARTHUR C. SKJOLD, M.D. (closing): The mortality of bowel obstruction we know is high, and I am aware of the desperate plight in which these patients find themselves, having observed them in the different hospitals where I have worked. Many of them come in with an early existing peritonitis, and it seems to me that the procedure in these cases depends on one's own personal

*(Continued on Page 86)*

# CLINICAL-PATHOLOGICAL CONFERENCE

## EVALUATION OF LIVER FUNCTION TESTS

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DR. A. H. WELLS: After sixteen years of critical experience with the interpretation of the clinical significance of laboratory measurements of the various physiologic functions of the liver, we found a few tests of definite value in demonstrating (1) decreased liver cell function due to diffuse diseases of the liver, (2) mechanical obstruction of bile ducts, and (3) the progress of certain liver diseases. Other laboratory tests prove to be of no differential diagnostic value. Dr. Joffe has laboriously reviewed some of our more recent experiences with a selected group of patients.

DR. H. H. JOFFE: Liver function tests are valuable supplements but not substitutes for a carefully taken history and a thorough physical examination.[19] The present dissatisfaction with liver function tests is largely due to a tendency to rely solely upon the result of one particular test.[34] Early recognition of liver disease by means of physical findings alone is often difficult.[10] The most careful clinical history laboratory studies and the best of medical judgment often do not enable one to distinguish medical or hepatocellular from surgical or obstructive jaundice. In our experience there are several laboratory tests which, when used together, greatly increase the physician's diagnostic ability in this frequent and serious field of medical practice.

I will now present for consideration our viewpoint of the literature and our experience with the icterus index, total serum bilirubin, qualitative Van den Bergh, quantitative direct and indirect Van den Bergh, cephalin flocculation, urine and stool urobilinogen, blood cholesterol and cholesterol esters, galactose tolerance, hippuric acid test, bromsulphalein excretion test, blood proteins and liver biopsy.

### Icterus Index

The normal icterus index ranges from 2 to 6 units. It is a nonspecific color comparison test which is used clinically because of its simplicity.[4] The test is a rough but practical index of the degree of bilirubinemia. Hemolysis and turbidity of the serum interfere with the color comparison. Other substances such as carotene, lipochromes, and xanthophyll may impart a yellow color to the serum, thereby increasing the difficulties in interpretation.[4,14,43] In comparison, the quantitative Van den Bergh is an accurate scientific chemical measurement of bilirubin in the blood.

There is a wide range of the blood bilirubin (when measured by any method) in the hepatocellular causes of jaundice.[39] In the obstructive types of jaundice the icterus index is usually higher in the neoplastic jaundice, the average being about 100 units. In jaundice due to calculi it is rarely above this level. However, due to a considerable overlapping, the use of this test as a reliable means of differentiation is questionable.[39]

TABLE I. ICTERUS INDEX

| Units | Hepatitis | Cirrhosis | Neoplastic | Cholelithiasis | Common Duct Stone |
|---|---|---|---|---|---|
| Under 20 | 0 | 4 | 1 | 0 | 0 |
| 20–60 | 37 | 11 | 2 | 20 | 2 |
| 61–100 | 17 | 0 | 3 | 5 | 4 |
| 101–140 | 3 | 1 | 3 | 1 | 0 |
| Over 140 | 0 | 2 | 8 | 0 | 3 |
| Total | 57 | 18 | 17 | 26 | 9 |

In our series (Table I), eleven out of seventeen cases (64.7 per cent) of neoplastic (common duct obstruction due to cancer) jaundice showed an icterus index above 100 units. In the cases of hepatitis, thirty-seven of fifty-seven (64.9 per cent) showed an icterus index of under 60 units. In the group of cirrhosis, in fifteen of eighteen (83.3 per cent) the icterus index was under 60 units. In twenty-five of twenty-six cases (96 per cent) of cholelithiasis with or without cholecystitis, the index was below 100 units, and of the common duct calculi, six out of nine or (66 per cent) showed an icterus index under 100 units.

In conclusion, the tendency for neoplastic obstruction of the common duct to produce higher degrees of bilirubinemia is similar to the findings of others. It is, however, obvious that the test cannot be used with much success for differential diagnostic purposes, but must be limited to a measurement of degree of bilirubinemia.

### Quantitative Van den Bergh

The total serum bilirubin is normally below 1.0 mg. per 100 c.c.[10,26,37] The total is roughly one tenth of the icterus index.[4,14] It is below 0.5 mg. per 100 c.c. in about 75 per cent of cases.[4] Jaundice is difficult to recognize if the level is below 2 mg. per cent.[10] In a group of cases the average value of the total bilirubin was found to be 10 to 15 mg. per cent in the obstructive jaundice due to stone, with a somewhat higher average, 20 to 30 mg. per cent, in neoplastic obstruction of the common duct. Some of the highest values of 30 to 50 mg. per cent were found in the cases of acute hepatocellular and neoplastic jaundice cases.[35]

From the Department of Pathology, St. Luke's Hospital, Duluth, Minnesota.

TABLE II. TOTAL SERUM BILIRUBIN

| Condition | No. of Cases | Mg. Per Cent | | | |
|---|---|---|---|---|---|
| | | 1–5 | 6–10 | 11–15 | 16–20 |
| Hepatitis | 42 | 24 | 15 | 3 | 0 |
| Cirrhosis | 12 | 7 | 3 | 2 | 0 |
| Neoplastic | 13 | 5 | 4 | 3 | 1 |
| Cholelithiasis | 19 | 13 | 6 | 0 | 0 |
| Common Duct Stone | 7 | 2 | 2 | 1 | 0 |

A study of Table II can lead to but one conclusion, that an accurate measurement of the serum bilirubin does not aid in differentiating various causes of jaundice. The quantitative Van den Bergh test is the choice for following small daily variations of bilirubinemia in jaundice patients.

### Qualitative Van den Bergh

In the history of liver function tests there has been nothing so detrimental to the general usage of the tests as the original enthusiastic and wide acceptance of the direct and indirect Van den Bergh tests as reliable means of differentiating the "medical" from the "surgical" types of jaundice. The scientific aura which accompanied the numerous lectures, textbook discussions and bedside talks concerning the explanations of the direct, indirect, biphasic, delayed direct, et cetera reactions simply accentuated the disillusionment which followed.

The great majority of cases of obstructive jaundice were found in time to be a combination of the so-called regurgitation (direct reacting) and retention (indirect reacting) varieties[4] and pure forms of retention (indirect reacting) jaundice were rare.[30] The qualitative Van den Bergh has not proved of value in the clinical differentiation between jaundice due to diffuse parenchymal liver damage and that due to mechanical obstruction of the bile ducts.[38] The qualitative Van den Bergh may be of some value in the restricted field of differentiating hemolytic from other causes of jaundice.

In a study [34] of forty-one cases of cirrhosis, seventeen or (41.5 per cent) showed a positive reaction, of which twelve (70 per cent) were direct and five (30 per cent) were biphasic. Of eleven cases of hepatitis, nine (81.8 per cent) showed a positive reaction, of which seven (77 per cent) were direct and two (23 per cent) were biphasic. In six cases of neoplasm, four (66.7 per cent) gave a positive reaction, of which two (50 per cent) gave a direct and two gave a biphasic reaction.

A study of Table III will lead to the already proved conclusion that the qualitative Van den Bergh tests are of very little value in differentiating the diseases with hyperbilirubinemia.

TABLE III. QUALITATIVE VAN DEN BERGH

| Condition | No. of Cases | Direct | Per-centage | Indirect | Per-centage | Biphasic | Per-centage |
|---|---|---|---|---|---|---|---|
| Hepatitis | 46 | 28 | 60.8 | 4 | 8.7 | 14 | 30.5 |
| Cirrhosis | 14 | 9 | 64.4 | 2 | 14.3 | 3 | 21.3 |
| Neoplastic | 13 | 8 | 61.5 | 3 | 23.0 | 2 | 15.4 |
| Cholelithiasis | 24 | 10 | 41.6 | 4 | 16 6 | 10 | 41.6 |
| Common Duct Stone | 9 | 5 | 55.5 | 2 | 22.2 | 2 | 22.2 |

TABLE IV. QUANTITATIVE INDIRECT AND DIRECT BILIRUBIN

| Condition | No. of Cases | Total Mg. Per Cent | Range of Indirect | Average Per Cent of Total | Range of Direct | Average Per Cent of Total |
|---|---|---|---|---|---|---|
| Hepatitis | 22 | 1.24–11.4 | 0.092–0.095 | 14.9* | 0.245–10.964 | 85 1 |
| Cirrhosis | 10 | 1.20–14.4 | 0 506–3.54 | 46 2 | 0.33–12.0 | 53.8 |
| Neoplastic | 9 | 4.87–13.12 | 0.668–1 75 | 15.1 | 4.20–11.9 | 84.9 |
| Cholelithiasis | 14 | 3.1 – 8.62 | 0–3.92 | 22 | 1 55–7.74 | 78 |
| Common Duct Stone | 7 | 7.42–12.93 | 1.57–1.64 | 21.4 | 5.77–12.93 | 78.6 |

* In one case the indirect was 80.2 per cent of the total.

### Quantitative Direct and Indirect Van den Bergh

When the first reports of the use of the quantitative measurements of direct and indirect Van den Bergh reactions first appeared in the literature, our hopes were kindled anew with the belief that we now had a practical tool for the differentiation of "medical" from "surgical" jaundice. Although one can still find references in the literature as to the value of these tests in distinguishing diffuse diseases of the liver from mechanical obstruction of the bile ducts it is obvious that their value is quite limited.[4,41]

In a study[4] of 172 cases of hepatitis, forty-one cases of cirrhosis and seventy-five cases of extrahepatic biliary obstruction, both the indirect and direct reacting bilirubin was increased in the obstruction as well as in the parenchymal group.

The results in Table IV leave no doubt in our minds as to the unreliability of these tests for differentiating causes of jaundice.

### Cephalin Flocculation

The Hanger's test is a satisfactory index of the activity of parenchymal damage in the absence of hepatocellular damage complicating bile duct obstruction.[4,14] A positive reaction is apparently due to changes in the globulin fractions of the serum occurring with certain types of inflammatory and degenerative changes. It may be an index of liver cell irritation or damage rather

than a measure of the functional capacity of the liver.[8,12] It is more likely to be positive in diseases characterized by diffuse parenchymal involvement, especially cirrhosis.[2,4,9,18,24,37] Rosenberg[24] found the test of value in the early diagnosis of obstructive and parenchymatous jaundice. A negative or slightly positive reaction indicates an obstructive process and a moderate to strongly positive reaction denotes parenchymatous jaundice. Hanger[9] reported a negative or at the most a 1-plus flocculation in all of twenty-five cases of obstructive jaundice, and a moderate to strongly positive reaction in thirty-three of thirty-eight cases of hepatitis and cirrhosis. Hogland and Shanks [13] found a moderate to strongly positive flocculation in 115 of 125 cases of infectious hepatitis. Barker[2] found a moderate to strongly positive reaction in 50 to 75 per cent of 1,172 cases of hepatitis in the prodromal stage, with over 90 per cent positive in the acute icteric stage during the first weeks of the disease. In forty-seven cases of acute hepatitis without jaundice the reaction was positive in 53 per cent of cases. At the Presbyterian Hospital in New York[8] seventy out of seventy-seven cases of obstructive jaundice gave a negative reaction, while forty-eight out of sixty cases of catarrhal jaundice showed either a 3- or 4-plus flocculation.

The test is usually strongly positive in cases of cirrhosis but may be negative in the quiescent or healed stage. Therefore, a negative reaction does not exclude the diagnosis.[9] It is believed to be of prognostic value in both acute hepatitis and cirrhosis. A persistently strong positive reaction is of serious prognostic significance.[4,9,15,26] Hanger[9] found a definite correlation between the degree of flocculation, clinical course and the symptomatology in a study of forty selected cases of cirrhosis, chiefly of the alcoholic type. Some of the cases were followed three years and longer, and in seventeen cases which showed a persistently strongly positive reaction, twelve deaths occurred. In comparison, only three deaths occurred in twelve cases which showed a progressively diminishing reaction, and three in eleven cases which showed a persistently weak or negative reaction. In the same study no correlation was found between the degree of flocculation and the presence or absence of ascites. However, in the presence of jaundice and ascites or of jaundice alone, the test was rarely, if ever, negative.

Whether cirrhosis is the end of stage of fatty infiltration, or whether a fatty liver is especially more subject to damage by the unfavorable condition that may co-exist, is still a debatable question. Observations[9] however, favor the latter view, for a positive reaction seldom appears in fatty infiltration unless inflammation or acute degenerative changes are present.

If we disregard a 1-plus reaction as of no practical significance, then our series (Table V) collaborates the observation of others in that the cephalin flocculation is usually moderate to strongly positive in diseases characterized by diffuse parenchymal involvement. In our series (Table V), forty-nine of fifty-two cases (94.2 per cent) of hepatitis and thirteen of fifteen (86.6 per cent) of cirrhosis showed a 2- to 4-plus reaction. In comparison, 64.3 per cent of cases of neoplastic jaundice, 88.3 per cent of cholelithiasis and 85.8 per cent of common duct calculi showed a negative to 1-plus reaction.

TABLE V. CEPHALIN FLOCCULATION

| Condition | No. of Cases | Negative | 1 Plus | 2 Plus | 3 Plus | 4 Plus | Percentage |
|---|---|---|---|---|---|---|---|
| Hepatitis | 52 | 1 | 2 | 8 | 22 | 19 | 94.2 |
| Cirrhosis | 15 | 1 | 1 | 2 | 7 | 4 | 86.6 |
| Neoplastic | 14 | 7 | 2 | 1 | 3 | 1 | 35.7 |
| Cholelithiasis | 17 | 10 | 5 | 1 | 1 | 0 | 11.7 |
| Common Duct Stone | 7 | 5 | 1 | 1 | 0 | 0 | 14.2 |

### Urine and Stool Urobilinogen

Normally, much of the bilirubin of the bile entering the intestines is changed to urobilinogen by bacterial action. A certain portion of this decomposition product of hemoglobin is absorbed into the portal circulation and passes to the liver where it appears to be converted to bilirubin and re-excreted into the bile. The latter part of this cycle has been termed the enterophepatic circulation of bile pigment.[4,33,34,37,39]

The urine normally contains 0 to 4 mg. per twenty-four hours, usually ranging between 0.5 to 2 mg.[37,38] It usually does not exceed 3 mg. per twenty-four hours.[10,37] The urobilinogen of the stool varies from 40 to 280 mg. per day, the average being 100 to 250 for a four-day period.[35,37,40]

Persistent absence of urobilinogen from feces and urine indicates that bile is not entering the intestines and is usually the result of complete obstruction of the biliary passages by carcinoma. However, this occasionally occurs as a result of an impacted stone in the common duct, severe acute hepatitis, or complete cicatricial stricture of the duct.[32,36,41]

In acute hepatitis and cirrhosis, the normal "resynthesis" of absorbed urobilinogen to bilirubin is interfered with, and excessive amounts of urobilinogen appear in the urine. Therefore, the presence of urobilinogen in the feces indicates the bile passages are not occluded, and excessive amounts of urobilinogen in the urine indicate some impairment of liver cell function or an associated hemolytic process.[32,36,41] The only satisfactory proof of complete biliary obstruction is very low levels of fecal and urinary urobilinogen.[25,31,41]

A study[36] of 135 cases of jaundice in hepatic disease showed that jaundice due to a stone is not accompanied by any considerable increase in the urine urobilinogen, unless complicated by acute cholecystitis, cholangitis,

TABLE VI. URINE UROBILINOGEN

| Condition | No. of Cases | Negative | Per Cent | Above 4 mg. | Per Cent | Below 4 mg. | Per Cent | *Below 0.5 mg. | Per Cent |
|---|---|---|---|---|---|---|---|---|---|
| Hepatitis | 41 | 3 | 7.3 | 26 | 63.4 | 12 | 29 | 2 | 16.6 |
| Cirrhosis | 10 | 1 | 10.0 | 7 | 70.0 | 2 | 20 | 0 | .. |
| Neoplastic | 14 | 8 | 57.0 | 1 | 7.0 | 5 | 35.7 | 3 | 60 |
| Cholelithiasis | 11 | 5 | 45.4 | 5 | 45.4 | 1 | 9 | 1 | 100 |
| Common Duct Stone | 5 | 3 | 60.0 | 1 | 20.0 | 1 | 20.0 | 0 | .... |

* Number of cases below 4 mg. which showed urine urobilinogen below 0.5 mg.

TABLE VII. STOOL UROBILINOGEN

| Condition | No. of Cases | Negative | Per Cent | 40-280 mg. | Per Cent | Below 40 mg. | Per Cent | *Below 5 mg. | Per Cent |
|---|---|---|---|---|---|---|---|---|---|
| Hepatitis | 38 | 2 | 5.2 | 10 | 26.3 | 26 | 68.4 | 13 | 50 |
| Cirrhosis | 8 | 1 | 12.5 | 3 | 37.5 | 4 | 50.0 | 0 | .... |
| Neoplastic | 12 | 4 | 33.0 | 1 | 8.3 | 7 | 58.3 | 6 | 85.9 |
| Cholelithiasis | 13 | 0 | 0 | 10 | 76.0 | 3 | 23.0 | 1 | 33.3 |
| Common Duct Stone | 5 | 2 | 40 | 1 | 20.0 | 2 | 40.0 | 2 | 100 |

* Number of cases below 40 mg. which showed a stool urobilinogen below 5 mg.

biliary cirrhosis or severe anemia. In forty-nine out of fifty-three cases (92 per cent) of jaundice due to primary or secondary carcinomatous involvement of the extrahepatic biliary tract, there was complete obstruction as shown by less than 5 mg. of fecal urobilinogen per day.[39] In a combined group of 118 cases of calculous and parenchymatous jaundice, only 7.6 per cent exhibit complete obstruction, with less than 5 mg. of fecal urobilinogen per day.[39] In the same series, in 55 per cent of cases of biliary tract carcinoma the fecal urobilinogen was less than 1.0 mg. per day, in contrast with 1.7 per cent in the combined calculous and parenchymal groups. In another series,[38] out of fifty-six cases of cancerous jaundice, exclusive of primary or metastatic carcinoma of the liver, the fecal urobilinogen was less than 5 mg. in fifty-three (96 per cent). In the same series, out of forty-nine cases of calculous jaundice and sixty-two cases of parenchymal jaundice, only five (4.5 per cent) excreted less than 5 mg. of urobilinogen per day in the feces. In 120 cases[16] of acute infectious hepatitis while the icterus was present, normal urobilinogen in the urine occurred in only 16 per cent of cases. In forty-one cases of cirrhosis, thirty-four (82.9 per cent) showed an increased excretion of urobilinogen in the urine. In contrast, only four out of six cases (66.7 per cent) of neoplastic jaundice and five out of ten (50 per cent) of hepatitis showed an abnormally high excretion.[34]

In neoplastic jaundice the urine and fecal urobilinogen are less than 0.5 mg. and 5 mg. respectively per day in 90 per cent of cases.[40]

In our series (Table VI) thirteen out of fourteen cases of neoplastic jaundice (92.7 per cent) showed a negative or a urine urobilinogen below 4 mg. In contrast, fifteen out of forty-one cases (36.3 per cent) of hepatitis and three out of ten (30 per cent) of cirrhosis showed a negative or a urine urobilinogen below 4 mg.

The stool urobilinogen (Table VII) in eleven out of twelve cases (91.3 per cent) of neoplastic jaundice was either negative or below 40 mg. Of the seven cases below 40 mg., six were below 5 mg. In the group of hepatitis, twenty-eight out of thirty-eight cases (73.6 per cent) showed either a negative value or below 40 mg. Of twenty-six cases below 40 mg., thirteen (50 per cent) were below 5 mg. In the group of cirrhosis, 62.5 per cent showed a negative value or below 40 mg., however, none of the cases were below 5 mg.

### Cholesterol and Cholesterol Esters

The normal total blood cholesterol is 150 to 250 mg. per 100 c.c. of serum, with the esters comprising 60 to 70 per cent of the total.[14]

Hypercholesteremia is found in the majority of cases of uncomplicated extrahepatic obstructive jaundice. In such cases there is little or no significant alteration in the relative proportions of free and ester cholesterol.[4,37] However, hypercholesteremia occasionally occurs in mild hepatocellular jaundice, but much less frequently than in the obstructive type. In the former, the increase is usually in the free cholesterol fraction with the proportion of cholesterol esters diminished.[4,41]

A percentage proportion of esters below 60 per cent indicates a hepatocellular functional disturbance.[41]

In obstructive jaundice, there is usually a sharp rise in both the free cholesterol as well as the esters, which somewhat parallels the elevation of serum bilirubin. In contrast, there is a divergence, in the parenchymal jaundice, between the degree of serum cholesterol and bilirubin elevation.[4,32]

In acute or severe forms of hepatitis, the value for cholesterol may be decreased or normal; and the esters may diminish or disappear.[32,42] In a group of 105 cases[7] with obstructive jaundice, eighty-two (78 per cent) showed a total cholesterol of more than 300 mg. The esters were above 150 in seventy-nine (75 per cent) of the cases. Patients with obstruction of the biliary passages by carcinoma had a more striking hypercholesteremia than did those with obstruction due to a stone or stricture. In only eleven (10 per cent) of 111 cases of diffuse parenchymatous disease was the total cholesterol over 300 mg. In seventy-five (slightly over 67.5

TABLE VIII. CHOLESTEROL AND CHOLESTEROL ESTERS

| Condition | No. of Cases | Total Cholesterol | | | | Cholesterol Esters | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Above 300 mg. | | Below 150 mg. | | No. Below 60% of Total | Per Cent | No. Above 60% of Total | Per Cent |
| | | No. | Per Cent | No. | Per Cent | | | | |
| Hepatitis | 48 | 5 | 10.4 | 8 | 16.6 | 41 | 85.2 | 7 | 14.9 |
| Cirrhosis | 16 | 0 | .... | 2 | 12.5 | 15 | 93.7 | 1 | 6.2 |
| Neoplastic | 12 | 1 | 8.3 | 6 | 50.0 | 0 | .... | 12 | 100.0 |
| Cholelithiasis | 19 | 1 | 5.3 | 5 | 26.3 | 16 | 84.3 | 3 | 15.8 |
| Common Duct Stone | 7 | 3 | 42.8 | 0 | .... | 6 | 85.7 | 1 | 14.2 |

TABLE IX. GALACTOSE TOLERANCE

| Condition | No. of Cases | 3 Gm. or Less | Percentage | Greater Than 3 Gm. | Percentage |
|---|---|---|---|---|---|
| Hepatitis | 42 | 6 | 14.3 | 36 | 85.7 |
| Cirrhosis | 11 | 3 | 27.3 | 8 | 72.7 |
| Neoplastic | 10 | 9 | 90.0 | 1 | 10.0 |
| Cholelithiasis | 13 | 8 | 61.6 | 5 | 38.4 |
| Common Duct Stone | 6 | 3 | 50.0 | 3 | 50.0 |

per cent) the total cholesterol was normal or slightly decreased but the esters were definitely decreased.

In our series (Table VIII) of the combined group of hepatitis and cirrhosis totaling sixty-four cases, only five (10.4 per cent) showed a total cholesterol above 300 gm., and ten (15.6 per cent) were below 150 mg. In this same combined group of hepatocellular impairment, fifty-six (87.5 per cent) showed the cholesterol esters to be below 60 per cent of the total. In all cases of neoplastic jaundice the cholesterol esters were above 60 per cent of the total. Of the common duct calculi 42.8 per cent showed a total cholesterol above 300 mg., and 85.7 per cent showed the cholesterol esters to be below 60 per cent of the total.

### Galactose Tolerance

The galactose tolerance test is based on the ability of the liver to convert this sugar into glucose. If this conversion does not take place the galactose is completely excreted in the urine.[34] In the absence of diabetes, normally less than 3 grams of the sugar is excreted in 5 hours.[4,41] Excretion of more than 4 to 5 grams is indicative of severe hepatic impairment.[4,26,41] Although a positive galactose test is almost the rule in acute hepatocellular jaundice of average severity, a negative response may occur in mild or long standing cases.[1,4,26] It may be positive in long standing obstructive jaundice because of secondary parenchymal liver damage.[1,4,26]

A normal response does not exclude the possibility of parenchymal involvment and a borderline positive test should not be regarded as conclusive evidence against the presence of a mechanical biliary obstruction.[1,41]

The test does not uniformly distinguish between obstructive and hepatocellular jaundice, but it may furnish corroborative proof in doubtful cases.[1]

At the Mayo Clinic[41] the test was found to be mildly positive in 50 per cent of malignant obstruction cases and in 25 per cent of cases of obstruction due to a stone or cicatricial stricture. A positive response may be obtained in 30 to 45 per cent of patients with obstructive jaundice of various types.[1] In sixty-five cases of hepatitis, the test was positive in sixty-one (93.8 per cent). Of twenty cases of obstructive jaundice, less than 3 grams were excreted in all cases regardless of the duration of the jaundice or cause of the obstruction.[27] However, in a group of 167 cases with a normal synthesis of hippuric acid, only 7 per cent had abnormal excretion of galactose.[6] The test is more likely to be positive with diffuse hepatitis than with cirrhosis or neoplasm.[34]

In our series (Table IX) thirty-six out of forty-two cases of hepatitis (85.7 per cent) and eight out of eleven cases of cirrhosis (72.7 per cent) showed a positive test. However, only 10 per cent of the cases of neoplastic jaundice, 38.4 per cent of the cases of cholelithiasis, and 50 per cent of cases with common duct stone showed a positive test.

### Hippuric Acid

The test depends on the ability of the liver to furnish glycine to permit the synthesis of hippuric acid from benzoic acid.[4,14,41] Normally 3 grams of benzoic acid in the form of hippuric acid is excreted in the urine in four hours after the ingestion of 6 grams of sodium benzoate.

A low output of hippuric acid is strong, but not conclusive evidence of functional liver impairment.[21,26] Excretion below 3 grams indicates hepatic insufficiency, provided renal function is normal and the volume of urine is adequate.[4,26,37,41] The results of this test parallel those obtained with the bromsulphalein test in patients without jaundice.[32,41]

In two instances the test was of little value in a differential diagnosis as it showed some degree of reduction in practically every type of liver disease.[21,25]

The oral hippuric acid test shows practically no correlation with the clinical condition of the patient. It is frequently relatively low in the convalescent period from infectious hepatitis, and even after the oral administration of amino acetic acid in the form of gelatin just prior to the test, normal excretion occurred in 153 out of 156 cases.[2] In a study[6] of 381 patients with suspected liver disease, 167 (43.9 per cent) showed a normal excretion of 3 grams or more: 134 (35.9 per cent)

showed 2 to 3 grams; forty-nine (12.8 per cent) showed less than 1 gram in the urine.

In a group of non-obstructive jaundice, including acute hepatitis, metastic carcinoma of the liver and cirrhosis, 89 per cent of forty-six cases, using the intravenous route, and 52 per cent of nineteen cases, using the oral route, showed a positive test. In forty-seven cases of proven cholelithiasis the intravenous test was positive in 53 per cent, as compared to 6 per cent of fifteen cases in which the oral test was used.[17]

The test was found to give low results in cases of catarrhal jaundice, acute and chronic hepatitis, usually in cases of liver metastasis and in cases of cirrhosis. Normal results are obtained in uncomplicated cholecystitis and cholelithiasis, including obstruction, as the result of a stone in the common duct.[21,22,23] The test is thought to be valuable in differentiating between intrahepatic jaundice from that due to obstruction by a stone in the common duct. However, an obstruction of long duration as well as carcinoma of the head of the pancreas may lead to liver cell damage and therefore, give low results.[23]

In one study[4] the hippuric acid excretion was less than 2.5 gm. in 91 per cent of 270 cases of hepatitis, in 87 per cent of seventy-six cases of cirrhosis, in 63 per cent of 136 cases of common duct stone and in 43 per cent of sixty-seven cases of carcinoma of the pancreas.

In our series (Table X), using the oral test, the excretion was less than 3 grams in 81.6 per cent of cases of hepatitis, in 80 per cent of cirrhosis and in 60 per cent of common duct stone. However, the results were 3 grams or above in 70 per cent of neoplastic jaundice and in 63.6 per cent of cholelithiasis.

TABLE X. HIPPURIC ACID

| Condition | No. of Cases | Less Than 3 Gm. | Percentage | 3 Gm. or More | Percentage |
|---|---|---|---|---|---|
| Hepatitis | 38 | 31 | 81.6 | 7 | 18.4 |
| Cirrhosis | 10 | 8 | 80.0 | 2 | 20.0 |
| Neoplastic | 10 | 3 | 30.0 | 7 | 70.0 |
| Cholelithiasis | 11 | 4 | 36.4 | 7 | 63.6 |
| Common Duct Stone | 5 | 3 | 60.0 | 2 | 40.0 |

### Bromsulphalein

This test appears to be a measurement of the excretory function of the liver. Normally not more than 10 per cent of the dye is retained in the blood thirty minutes after administration. Not more than 5 per cent remains in the blood at forty-five minutes and none after one hour.[37,41]

The test is fairly delicate in detecting liver dysfunction in the absence of jaundice, but is generally positive in the presence of an icterus index greater than 20 units or a serum bilirubin greater than 2.0 mg. per 100 c.c.[4,10,1432,37,41] A positive test indicates some degree of liver injury but a negative test does not rule it out.[34]

In the presence of complete obstruction of the common bile duct, the degree of retention of the dye in the blood increases progressively with that of bilirubin. Therefore, this test gives us very little information that cannot be obtained by the quantitative serum bilirubin.[4,14] However, incomplete obstruction, with superimposed chronic biliary tract disease and hepatocellular damage, may show a retention of the dye out of proportion to the degree of hyperbilirubinemia. It is, therefore, of value in the preoperative study of patients with cholelithiasis.[4,14]

TABLE XI. BROMSULPHALEIN

| Condition | No. of Cases | No. of Positive | Percentage |
|---|---|---|---|
| Hepatitis | 26 | 17 | 65.3 |
| Cirrhosis | 7 | 4 | 57.0 |
| Neoplastic | 6 | 3 | 50.0 |
| Cholelithiasis | 8 | 3 | 37.5 |
| Common Duct Stone | 3 | 2 | 66.0 |

Abnormal retention occurs almost invariably in acute and chronic disease due to hepatocellular damage, the degree of retention being roughly indicative of the extent of hepatic functional impairment and usually parallels the degree of hyperbilirubinemia. As in the case of obstructive jaundice, abnormal retention of dye may occur before and may persist longer than the hyperbilirubinemia.[4,14]

Retention of dye occurred in 96 per cent of cases in which there was evidence of parenchymal hepatic injury or even moderate mechanical obstruction of the bile ducts which had not yet produced clinically demonstrable jaundice.[32]

In a study of seventy-six cases[3] with active chronic hepatitis that failed to recover completely from acute infectious hepatitis, the bromsulphalein test was found to be the most valuable. In this series, 64 per cent of forty-four cases in the nonicteric group and 69 per cent of twenty-six cases in the icteric group, for an average total of 66 per cent, showed an abnormal retention of dye. In comparison, only 47 per cent of forty-seven cases in the nonicteric group and 76 per cent of twenty-nine cases in the icteric group, for an average total of 58 per cent, showed an abnormal cephalin flocculation.

The test was positive in nine of eleven cases (81.8 per cent) of common duct stone and in all of five cases of neoplasma.[27] The test was also positive in thirty-seven of forty-one cases (90.2 per cent) of cirrhosis, in nine out of ten cases (90 per cent) of hepatitis, and in all of six cases of neoplasm.[34] In 42 per cent of fifty-two cases of proven cholelithiasis the test was likewise positive.[17]

In another series[4] the retention of dye occurred in 80 per cent of 270 cases of acute hepatitis, in 68 per

TABLE XII. SERUM ALBUMIN

| Condition | No. of Cases | Below 4 gm. | Percentage |
|---|---|---|---|
| Hepatitis | 19 | 4 | 21.0 |
| Cirrhosis | 13 | 8 | 61.6 |
| Neoplastic | 9 | 4 | 44.4 |

cent of seventy-six cases of cirrhosis, and in 100 per cent each of 136 cases of common duct stone and 67 cases of carcinoma of the pancreas.

In our series (Table XI), 65.3 per cent of cases of hepatitis and 57.7 per cent of cirrhosis showed an abnormal retention. In comparison, 50 per cent of cases of neoplastic jaundice, 37.5 per cent of cholelithiasis, and 66.6 per cent of common duct calculi showed an abnormal retention.

### Serum Protein

The protein of serum is normally 6 to 8 grams per 100 c.c.[4,14,,41] The serum proteins are usually altered in chronic diffuse liver disease with a reduction chiefly in the albumin fraction and an increase in the globulin. There is often a reversal of the albumin-globulin ratio, which is an important factor in the production of edema and ascites.[4,34,37,41] Total values as low as 3 grams per 100 c.c. have been reported in cirrhosis. The increase in the globulin fraction is more pronounced in chronic hepatocellular disorders than in biliary obstruction, which is usually not accompanied by a decrease in the serum albumin unless it is of long duration. However, a reduction in the serum protein is sometimes seen in acute hepatitis and chronic passive congestion.[4]

The serum albumin was less than 4 gm. in 30 per cent of 270 cases of acute hepatitis, in 63 per cent of seventy-six cases of cirrhosis, in 70 per cent of fifty cases of congestive heart failure, in 69 per cent of 136 cases of common duct stone, and in 79 per cent of sixty-seven cases of carcinoma of the pancreas.[4] The albumin concentration was under 4 gm. in thirty-three of forty-one cases (80.5 per cent) of cirrhosis.[34]

In our series (Table XII), the serum albumin was below 4 gm. in four out of nineteen cases (21 per cent) of hepatitis, in eight out of thirteen (61.6 per cent) of cirrhosis, and in four out of nine (44.4 per cent) of neoplastic jaundice.

### Liver Punch Biopsy

The addition of liver biopsy to laboratory tests affords an unparallel means of correlating functional with histologic changes. The value of this procedure in the differential diagnosis of jaundice cannot be overemphasized, and in equivocal cases of diffuse diseases such as hepatitis and cirrhosis an absolute diagnosis can be made.

The manifestations of cirrhosis are so varied and so often preplexing that the clinician needs all available aids in making a diagnosis.[12]

The danger of death from hemorrhage should not be a stumbling block in the routine performance of this procedure, providing the prothrombin, clotting and bleeding times are checked prior to the procedure. There are only twelve deaths reported in the literature ascribed to needle biopsy, and most of these occurred during the early days of trial of this procedure.[11]

At the University of Minnesota needle biopsy had been attempted in eighty cases since October, 1942,[11] and was found to be of great value in the clinical study of liver diseases as well as a great diagnostic aid.

One can expect reasonably good results in cases of cirrhosis and acute hepatitis. However, it is conceivable how a carcinoma nodule might be by-passed.[11,12,28]

In our series of fourteen cases in which a clinical diagnosis of hepatitis was made, the liver biopsy diagnosis did not confirm the clinical diagnosis in six (42.8 per cent), primarily due to inadequate biopsy material. The diagnosis of cirrhosis by biopsy in ten cases was confirmed by autopsy in all cases. In eight cases clinically diagnosed as carcinoma, a liver biopsy confirmed the clinical diagnosis in only three (37.5 per cent).

### Conclusion

Our broad statistical study of the various liver function tests does not show their true usefulness. When many other factors of the clinical history and physical findings are taken into account, the efficacy of some of the tests in differentiating "surgical" from "medical" jaundice is greatly increased. Using our figures, which check closely with those found in the literature, one can see the value of multiple tests. If, for instance, the cephalin flocculation test is 75 per cent accurate, add to this the roughly similar accuracy of several tests and the end result of the combination will be well worth the effort of running the series. A long experience in the interpretation of the results of these tests is indeed valuable. Tests other than those we have reviewed, including the thymol turbidity, alkaline phosphatase and the duodenal drainage, have proved their place in this difficult field of medical diagnosis.

Studies of the blood bilirubin are useful in determining the amount and progress of bile retention. Any attempt at using the various Van den Bergh tests for differentiating the diseases with jaundice is subject to too much error and should be discouraged.

The cephalin flocculation test is a fairly reliable means of differentiating diffuse parenchymal damage from that due to an obstruction of bile ducts. In our series, forty-nine of fifty-two cases (94.2 per cent) of hepatitis and thirteen of fifteen (86.6 per cent) of cirrhosis showed a 2- to 4-plus reaction. In comparison, 64.3 per cent of cases of neoplastic jaundice, 88.3 per cent of cholelithiasis, and 85.8 per cent of common duct calculi showed a negative to 1-plus reaction.

Very low levels of urine and fecal urobilinogen are satisfactory proof of complete biliary obstruction. In our series of neoplastic obstructive jaundice, 92.7 per cent showed a urine urobilinogen that was negative or below 4-mg. and 91.3 per cent showed the stool urobilinogen to be either negative or below 40 mg. However, 36 per cent of forty-one cases of hepatitis had a negative or below 4 mg. per cent level of urobilinogen.

Hypercholesteremia, above 300 mg. per 100 c.c., is frequent (42.8 per cent) in cases of common duct cal-

culi, while only 10.4 per cent of the combined group of hepatitis and cirrhosis have a total blood cholesterol above 300 mg. Blood cholesterol ester levels must be interpreted with much caution. When they fall below 20 or 30 per cent of the total cholesterol, diffuse disease of the liver is indicated especially when successive tests reveal a continuous drop. Small decreases of the ester below 60 per cent of the total are of no significance as a differential test.

In our combined series of hepatitis and cirrhosis, the galactose tolerance test was positive in 86.6 per cent of cases, as compared to 10 per cent of cases of neoplastic jaundice, 38.4 per cent of cholelithiasis, and 50 per cent of common duct stone.

Using the oral test, less than 3 grams of hippuric acid was excreted in the urine in 81.6 per cent of cases of hepatitis, 80 per cent of cirrhosis and 60 per cent of common duct stone, while in neoplastic obstruction of the common duct and cholelithiasis, 70 and 63.6 per cent respectively showed an excretion of 3 grams or more. The intravenous hippuric acid test may be a means of increasing the diagnostic laboratory accuracy.

The bromsulphalein excretion test has its use limited to the detection of liver cell disfunction in the absence of jaundice. The results of our short series of studies of blood proteins confirms the usually accepted interpretation of this test.

When a dependable method of preventing bleeding from the site of a liver punch biopsy is found, this test will be the best for demonstrating diffuse diseases such as hepatitis and cirrhosis.

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# History of Medicine In Minnesota

## NOTES ON THE HISTORY OF MEDICINE IN FILLMORE COUNTY PRIOR TO 1900

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*(Continued from December issue)*

**Milton A. Trow,** the youngest child of Dr. Augustus Howland Trow, was born at Montezuma, New York, on May 10, 1853, and came with his parents and his two brothers, Henry Nathaniel and Willam Howland, and his one sister, Ellen Acenith Trow, to Chatfield, Fillmore County, Minnesota, in 1856 when he was about three years old. In Chatfield he grew up, received his early education and spent much of his life. His wife was May E. Dann, to whom he was married in Chatfield on December 18, 1876, the daughter of Mr. and Mrs. Amos D. Dann, originally of Chatfield, later of Jackson, Minnesota.

In 1876 Milton Trow was graduated from the College of Physicians of Keokuk, at Keokuk, Iowa, and began the practice of medicine in association with his father in Chatfield and a wide surrounding territory in Fillmore and Olmsted Counties. In the following year there were in the county three Drs. Trow, when William H. Trow, newly graduated from the same medical school at Keokuk, began his medical practice, not in Chatfield, but in the village of Fillmore, some miles to the southeast.

Early in his professional career Milton Trow, newspaper notices would indicate, began lecturing on anatomy, physiology and phrenology in villages of the two counties. As has been noted, he was one of the physicians of the late seventies who co-operated with the State Board of Health in the preparation of reports on local conditions of health and sanitation; and in 1880 he was appointed county physician in Elmira and Orion Townships of Olmsted County. Under the "Diploma Law" of 1883 he became the possessor of state certificate No. 874 (R), given on April 19, 1884, filed in Fillmore County on September 14 of that year. By then he was announcing himself in a professional card as a physician and surgeon who would attend to all professional calls, day or night, promptly. And in 1884, concerned with farming as well as with medicine, he advertised "a lot of 90 day yellow dent corn for sale."

There occurred in 1883 an incident in his medical practice that was disagreeable but that ultimately did him no harm and perhaps was helpful. The fact that Dr. Franklin Staples, of Winona, was called in consultation in the case concerned and that a letter from Dr. Staples to Dr. Augustus H. Trow subsequently was published in the *Chatfield Democrat* on March 10, 1883,

at the request of the senior Dr. Trow, "for the especial benefit of those who prefer to spread false reports rather than the truth," lends interest. The letter follows:

Winona, February 24, 1883.

I attended the late Mr. ————in consultation with Dr. M. A. Trow on Saturday the 19th inst. In my opinion the patient was suffering from a complication of diseases, in which the liver and right lung were involved. I think there was and had been for some time, a pneumonia in the posterior lobe of the right lung, also enlargement of the liver and threatened hepatic abscess. I thought the treatment in the case had been and was good. I advised its continuance in the main and suggested the use of nitro muriatic acid. I spoke openly and plainly and gave the above opinion both to Dr. Trow and to the friends by themselves, and have not expressed any other opinion, nor had any other to express. The treatment was the same I should have given. I regarded the prognosis of the case as extremely unfavorable.

Beginning in the early eighties Dr. Augustus H. Trow and Dr. William H. Trow became increasingly interested in the agricultural properties which they had acquired in Dakota Territory and in 1887 they went west to settle in the new country. After their departure Milton Trow practiced alone from his headquarters in Chatfield, and in the ensuing twelve years he greatly extended his work. In 1892 he had established branch offices in Olmsted County, one at the Russell House in Pleasant Grove and one at the Everett House in Eyota, in each of which he spent one day a week. It was during this period also that he achieved his well-earned reputation as an able obstetrician, receiving praise from Dr. J. B. McGaughey, at a meeting of the Winona County Medical Society: "Over fifteen years' practice without a fatal case or having to be helped is a record of which any man might be proud." (*Chatfield Democrat,* October 16, 1892.)

In the winter of 1893, perhaps then in the period of his heaviest professional activities, Dr. Trow on a night in early March, when the roads were almost impassable, was injured severely about the head and shoulders when his cutter overturned. Already in a state of extreme fatigue (judging from detailed newspaper accounts of certain incidents in his practice), after the accident for many weeks he was seriously ill, having received a concussion of the brain, and was the subject of medical consultation to which were called Dr. J. P. Waste, of Plainview, Dr. A. W. Stinchfield and Dr. W. A. Allen, of Rochester, and Dr. C. McH. Cooper, of Chatfield; Dr. A. H. Trow had come from Dakota. Not long afterward, on the advice of his physicians to go somewhere "where absolute quiet and freedom from visitors and business could be obtained," Dr. M. A. Trow and his wife and their little daughter, Ruth, went to Jackson, Minnesota, for a period of his convalescence, to stay with Mrs. Trow's parents.

It was a year or two later, when relatives were hoping that Dr. Trow would settle permanently in Jackson, that friends in Chatfield sent to the editor of the *Chatfield Democrat* for publication a sincerely eulogistic set of reasons why they would "dislike to have him go." He was, they said, a man of good moral character, a good citizen, a true Christian gentleman. As an able practitioner and a completely successful surgeon for more than twelve years, he was greatly in demand. He stood at the head of his profession as president of the Fillmore County Medical Society, was an officer and an active member of the Olmsted County Medical Society and an honorary

member of the Winona County Medical Society. He had done more to elevate the standards and maintain the dignity of the medical profession than any other man in southern Minnesota. His worst fault was that he was a poor collector and that he did too much charity work for his own good (his generosity being "inherited from his father"). "We could get 2,000 signatures on petition requesting him not to go. We know that family ties are strong, but we hope the Doctor will not leave us." Dr. Trow did remove to Jackson, however, although not until late in the nineties. In the meantime, in 1894, Mrs. Trow was seriously ill; in that year also Dr. Trow was offered, but did not accept, a post as district surgeon of the Chicago and Northwestern Railroad, and it was stated, again in the local *Democrat*, that he had two opportunities to join medical firms in Winona.

It was in the nineties and soon after the turn of the century that Dr. Trow was most active in the work of medical associations. On June 19, 1890, at the twenty-second annual meeting of the organization, he was elected to membership in the Minnesota State Medical Society, and in 1892, when the Southern Minnesota Medical Association was organized at Winona, on July 28, he was one of the charter members and was elected second vice president. It is interesting to note that at the initial meeting Franklin Staples, of Winona, was president; Nathaniel S. Tefft, of Plainview, first vice president, and Horace W. Witherstine, of Rochester, secretary and treasurer. Dr. Trow's name continued on the roster through 1897. After moving, probably in 1899, from Chatfield to Jackson, in Jackson County, he was affiliated with the Jackson County Medical Society, as witness the following item which appeared in the *Northwestern Lancet* in February, 1901: Dr. M. A. Trow of Jackson, Minnesota, contributed a very sensible article in the form of a letter, to a local paper on the subject of physicians' fees. Dr. Trow, as president of the Jackson County Medical Society, which voted unanimously for the common country fee schedule, was charged with forming a trust. Dr. Trow will never suffer much from such a charge in or out of Jackson County."

In May, 1902, it was announced in the *Northwestern Lancet* that Dr. M. A. Trow, formerly of Chatfield, Minnesota, had located at Lamberton, Redwood County, and had formed a partnership with Dr. Crandall of that place. Evidently the arrangement was of short duration, for in March, 1903, Dr. Trow, recently of Currie, in Murray County, had removed to Avoca, a few miles south in the same county, and there he remained until after 1917; in the issue for 1918 his name appeared for the last time in the directory of the American Medical Association, followed by the symbol for "Address Unknown."

In these later years his health had begun to fail and in the next half decade he carried on but a desultory medical practice. He finally returned to his old home of Chatfield, to be among the associations of early years, although no member of his immediate family then was residing in the village. His wife had died some years previously; of the three children, two had died in infancy and the third, Ruth, lived to the age of only sixteen or eighteen years. A little story concerning those children has come down through reminiscent channels. On an occasion when Ellen Acenith Trow Bibbins was visiting her brother in Chatfield, when he was a young physician, Ruth, then a very small girl, was gaily pounding her chair with her silver drinking cup. "Mit," said the sister, "she will spoil that chair and cup." To which Dr. Trow replied, "I hope she does. We have had two

little ones leave us without a scratch to know they had ever been here, and if she goes, I want something as a reminder."

Toward the end of his life, no longer practicing medicine, Dr. Trow closed his office in Chatfield, which for a time he had maintained in the building of the Root River State Bank; in those terminal months the Chatfield Meridian Lodge of the Masons gave him the fraternal aid and care of which he was in need.

Milton A. Trow, who lives in the kindly memories of his old friends and associates, died suddenly in Chatfield on March 16, 1923. He was survived by his sister, Ellen Trow Bibbins, who then was living in Tulsa, Oklahoma; Mrs. Bibbins, who was married to Edward Bibbins, of Chatfield, on July 26, 1864, died in Tulsa at the home of her only child, Zilla Eulalie (Mrs. Samuel Alexander) Patrick, on February 18, 1936; Mr. Bibbins had died in Chicago in 1902. The eldest of the Trow brothers, Henry Nathaniel, had died in Des Moines, Iowa, on January 31, 1908. Notes on Dr. William Howland Trow follow this sketch.

**William Howland Trow,** the second of three sons and the third of the four children of Dr. Augustus Howard Trow, was born at Victory, New York, on August 8, 1851, and was about five years old when the family settled in Chatfield, Fillmore County, Minnesota, in the summer of 1856.

With his sister Ellen Acenith and his brothers Henry Nathaniel and Milton Augustus, William H. Trow went to school in Chatfield. In due time he received his formal medical training at the College of Physicians and Surgeons of Keokuk, Iowa, from which he was graduated on February 13, 1877, a year after Milton Trow had taken his degree at the same school. Before he began his medical study, William Trow had been married to Agnes M. Simpson, of Chatfield, on December 25, 1872. When he returned to Fillmore County from Keokuk, he settled with his family in Fillmore Village and there and in Wykoff he carried on his medical practice until he moved to Dakota Territory with his father in 1887. In Minnesota, on April 19, 1884, under the medical practice act of the preceding year, he received state license No. 916 (R), and his father and brother were licensed on the same day. And in Dakota, on July 11, 1887, both he and Dr. A. H. Trow, then residents of Carthage, Miner County, were licensed to practice in the territory. As noted previously, Dr. Augustus A. Trow had owned land in Dakota since the early eighties and it is probable that both he and William Trow had spent considerable time in the territory before they finally left Minnesota.

Dr. and Mrs. William Howland Trow were the parents of seven children, of whom the eldest two died in infancy; the others were Maude, Nina, Edith, Charles and Halcy. In the years at Carthage the family was affiliated with the Episcopal Church of Howard, South Dakota.

In 1901, Dr. Trow, accompanied by his immediate family and his father, moved from Carthage to Ethan, South Dakota, where he continued in active medical practice for about ten years. As noted, his mother had died in 1898 at Carthage; his daughter Maud (Mrs. Mack) died in 1902; his father died at Ethan in 1904. Early in 1920 Dr. Trow was ill for two months from cardiac disease; a stroke of paralysis hastened his death, which occurred ten days later, on April 5, 1920. He was survived by his brother and his sister Ellen; his wife, two sons, Charles S. and Halcy C. Trow, and one daughter, Mrs. Nina Oatbout, all of Ethan; one daughter, Mrs. Edith Swartz, of Parkston, South Dakota; and six grandchildren.

**Herbert Eugene Twitchell,** son of one of Chatfield's earliest and most respected pioneer physicians, mistakenly was said (in a Minnesota medical journal in 1929)* to have practiced medicine for many years in Chatfield. In correction, and as part of his father's story, a brief sketch of his life is given here.

Herbert Eugene Twitchell, the first white child native to the village, was born in Chatfield, Fillmore County, on March 27, 1855, the son of Dr. and Mrs. Refine W. Twitchell. With his sisters, Sarah Edna, Carpie and Martha Arnold (his only brother, Steven, died in infancy) he received his early education in the schools of Chatfield, attending some of his classes in the stone building that had housed the Chatfield Academy in its short but honorable span. After his graduation from the Chatfield schools, he was a student at the Winona Normal School and thereafter taught school for a while before beginning his medical training at the Louisville (Kentucky) Medical College. From Louisville he was graduated in 1877, the winner of a scholarship, and shortly afterward began the practice of medicine in the little village of Darrtown, Butler County, Ohio. In 1882 Dr. Twitchell took postgraduate work at the Miami Medical College, Cincinnati, from which he received a degree, and in 1885 studied at the Cincinnati General Hospital. On April 18, 1886, he opened an office at Hamilton, also in Butler County, where he resided and followed his profession until a few years before his death.

During the Spanish-American War of 1898 Dr. Twitchell was appointed a surgeon of the First Volunteer Infantry of Ohio, with the rank of captain, and so served until the end of the war. In 1915 he was named surgeon of the Central Branch of the National Military Home at Dayton, Ohio, but did not accept the position. He was a member of the Sons of the American Revolution and of the Military Order of the Loyal Legion of the United States Army, which is composed of the sons of officers of the Armies of the United States.

In 1878 Herbert E. Twitchell was married to Carroline A. Spencer, of Louisville, Kentucky, and of this union one child was born, Anna Spencer Twitchell. A second marriage, to Elizabeth Deuscher, of Hamilton, Ohio, took place in June, 1896; the only child was Herbert D. Twitchell, who died at the age of thirty years, from pneumonia, leaving a wife and two sons.

Dr. Twitchell died at the Dayton Military Home on March 4, 1929. Of his immediate relatives there were living in 1943 his daughter, Anna Twitchell (Mrs. Dwight S.) Person and his sister Arna (Martha Arnold; Mrs. W. J.) Broome, both of Los Angeles, and three grandsons, all in the armed forces; Dwight S. Person, Jr., Herbert Deuscher Twitchell and John Lee Twitchell. Anna Twitchell Person has gained some prominence as a writer of verse for leading periodicals throughout the country; her facility, she has said, has come down to her from her grandfather, Dr. Refine W. Twitchell, who wrote good verse, and from an uncle, John Weekes.

Herbert E. Twitchell, without pretension to writing, produced some verses in honor of Chatfield which were published in the *Chatfield Democrat,* in 1880, and because they concern the village and scenes familiar to many of the physicians mentioned in this account, a few lines are appended:

*Journal-Lancet, May, 1929, page 216.

Dear old Chatfield—how I love thee!
How I love thy very name —
How thine image comes before me,
Pictured out within my brain.
***
There's the mill and there's the meadow;
There's the creek and there's the pond;
There is dear old Root River,
With the woodland just beyond.
***
Dear old Chatfield! How I love thee!
Though far away my lot is cast,
How I hope in years that follow
To return to thee at last.

**Refine Weeks Twitchell** was born at Weybridge, Addison County, Vermont, on March 29, 1823, the son of Quaker parents, Jonas and Sarah Twitchell. Jonas Twitchell, son of Daniel Twitchell, was descended from old colonial stock; his first ancestor in America was Benjamin Twitchell, a founder of Dorchester, Massachusetts, one of two brothers who came from England to New England in 1630. Refine W. Twitchell was proud of the fact that his grandfather, Daniel, was an American soldier in the American Revolution, answered the call at Lexington, was wounded at Bunker Hill and was with Washington during the memorable winter at Valley Forge; Daniel Twitchell's Documentary War Record from the Revolution is cherished by the Twitchell family as one of its choicest treasures.

When Refine Twitchell was ten years old, his parents moved to Michigan and settled in Somerset, Hillsdale County. It was there that the boy completed his preliminary education and in due time decided to fit himself for the profession of medicine. In a biographical account in the Fillmore County History of 1882 it was stated that the young man began his medical study in 1845, at Dexter, Illinois; it may have been, however, at Dexter, Washtenaw County, Michigan, not far from his home and only a few miles northwest of Ann Arbor.

Because Refine W. Twitchell was an early student (1851-1852) at the Medical School of the University of Michigan and because he was one of the earliest representatives of the school to practice medicine in southern Minnesota, space is given here to suggest the details of his medical education. Michigan was the first pioneer state to recognize the importance of professional education in medicine. When the medical school was opened at the University of Michigan, in 1850, there was specified in its official announcement that its course of instruction was to run from the first Wednesday in October to the third Wednesday in April and was to consist of lectures, quizzes and a short course in anatomy. (This was, in fact, the curricular menu of all medical schools in the country at that time.) Its endorsement of the preceptor system, which was long to remain in use, was stated in the requirements for entrance: The student must present satisfactory evidence, first, that he had pursued the study of medicine and surgery for the term of three years with some respectable practitioner of medicine;† second, he must be of good moral character and also of such literary attainments as had been recommended by the National Medical Associ-

†In 1855, in emphasis of the value of preceptorship, the school in its annual announcement stated that "clinical instruction, it is believed, is far better imparted in the walks of private practice, especially in that section of the country where the student was to locate himself, than can be done even in the best regulated hospital. The hasty walks through the wards of a hospital furnish at best but a sorry substitute for the close and accurate study of cases as they occur in the professional rounds of the private practitioner."

ation, as follows: "A good English education, the knowledge of Natural Philosophy, the Elementary Mathematical Sciences, and such an acquaintance with the Latin and Greek languages as would enable the student to appreciate the technical language of medicine and read and write prescriptions." For graduation the student must have attended the full courses of lectures, the last of which must have been in the Medical Department of the University of Michigan; he must have submitted to the faculty an original thesis in his own handwriting on some medical subject; and he must have passed an examination, held at the end of the study, satisfactory to the faculty.

On completion of his work at the University of Michigan, in 1852, Dr. Twitchell began his practice of medicine in Somerset, his childhood home. On May 23 of that year he was married to Martha Jane Carpenter, of Albany, New York, who was born at Greenville, New Hapmshire, on April 6, 1831. Early determining to move westward, Dr. and Mrs. Twitchell, in 1854, with their infant daughter, Sarah Edna, only a few months old, traveled into Minnesota Territory and settled in Chatfield, a fledgling village which had been platted in the spring of 1854 and which lay in both Fillmore County and Olmsted County. And there, with a few fellow pioneers in a sparsely settled region, they met the adventures, discomforts and hazards of frontier life. Dr. Twitchell was the first physician in Chatfield Township of Fillmore County and also in Orion Township, Olmsted County.

In Chatfield, Dr. Twitchell, who was a man of ability and versatility, and many of the pioneer physicians possessed these qualities, engaged in various occupations which he found desirable or, perhaps, expedient, because on the frontiers in the fifties and later, conditions were such as to make the practice of medicine inadequate as a source of income. His professional card appeared in the first issue of the *Chatfield Republican*, on October 25, 1856: "Refine W. Twitchell, M.D., Physician and Surgeon. Will be found in his office on Main Street at all times except when absent professionally. Particular attention paid to surgery and diseases of women and children." And in the same autumn he had a card in the newly established *Chatfield Democrat* also, and continued thereafter to insert varied announcements in the two newspapers. By 1858 he found it necessary to act as pharmacist as well as physician and surgeon, and on the corner of Main Street that later was to be occupied by Easton's Bank, stood Dr. Twitchell's drugstore, the first in Chatfield. The building was constructed of logs and housed the shop in front, and in the rear, the physician's residence. In this house, on March 27. 1855, was born Herbert Eugene Twitchell, the first white child native to Chatfield Township, and in the next four years were born there Steven (who died in infancy) and Carpie, and in the later sixties Martha Arnold ("Arna").

By the summer of 1859 Dr. Twitchell's enterprise had expanded. His announcement of August 13, in the *Chatfield Democrat* was ethical and acceptable in the established tradition of the time for a physician-druggist:

R. W. TWITCHELL, M. D.
Dealer in
Drugs and Medicines
Paints, Oils and Chemicals, Pure Wines, and
Liquors for Medical Purposes. Trusses and Braces.
STRYCHNINE
A variety of Fancy and Toilet Articles
Particular attention paid to office prescriptions. Surgical operations
performed at office and elsewhere.

It perhaps was in this shop* as a laboratory that he investigated the medicinal value (which he questioned) of oil from rattlesnakes.

In separate notices Dr. Twitchell, who was a skilled orchardist, announced that trees were available. And he early manifested interest in the land, for his name on old topographical maps indicate that R. W. Twitchell was the owner of tracts in various parts of Fillmore and Olmsted Counties, and it is said that in the archives of long-established law offices his name may be seen on many legal documents relating to the transfer of property.

That Dr. Twitchell was interested in educational progress is evidenced by the fact that when the Chatfield Academy was incorporated on February 25, 1856 (it was organized on May 29, 1856), he was one of the thirteen trustees and one of the executive committee of three. The academy, after its preliminary months, was housed in its own building, three stories high and of native stone, which stood on the south corner of block 27, just across the street from Dr. Twitchell's residence on the east corner of block 38; as was pointed out to the writer, the peculiarity of this description is owing to the fact that the original plat of Chatfield was laid out northwest and southeast, parallel to the bluff which flanks the village. The academy functioned for several years, an excellent educational institution known over a large region, until it was superseded by the schools of the state. In addition to his work for the academy Dr. Twitchell served also on the village school board, in 1855 and 1856 and again in 1860 and 1861.

During the Civil War Dr. Twitchell enlisted, in August, 1862, in the Ninth Minnesota Volunteer Regiment of Infantry, which was organized in the nation-wide response to the President's call of July 2 of that year for additional troops (300,000 men). On September 18 the regiment was announced officially to contain Companies A to K inclusive, with Charles W. Le Boutellier as surgeon and Refine W. Twitchell as first assistant surgeon. Dr. Twitchell was mustered in on October 6, 1862. In July, 1864, he was promoted to surgeon of the Seventy-second Colored Infantry and in that capacity served until the close of the war. Records have revealed that he thereafter served in army hospitals in the Department of Ohio until 1866 and that in this final period he was in charge of hundreds of cases of smallpox during an epidemic of the disease in virulent form. His vigilance and skill in the care of his patients were such that he saved them all and sent them out unmarked by scars of the disease. When he returned to Chatfield in the summer of 1866, Dr. Twitchell brought with him a black boy named Web, who had been assigned to him in the army as chore-boy and general factotum and who in Chatfield aroused great interest, inasmuch as he was the first Negro the children and even many of the adult residents of the village had seen. At the beginning of the Civil War Dr. Twitchell had in progress the building of a new, and, for those times, pretentious residence, a house of ten rooms; during his absence in the army Mrs. Twitchell supervised its completion. For many years the family occupied this home; in later times it once was occupied by Dr. Florence J. Halloran and once by Dr. Charles McH. Cooper. It was still known, in 1943, as "the Twitchell place."

At home again, in 1866, Dr. Twitchell, on resuming his medical practice, published the following notice: "MEDICAL AND SURGICAL: I am now ready to resume the practice of my profession, after an absence of four years; during which time I have been connected with the Union Army.

*In the possession of the doctor's youngest daughter, Arna (Mrs. Broome), of Los Angeles, is the worn remnant of the counter brush used by her father in the old log drug store; she has stated (1943) that the brush would be available for a local museum of relics.

I do this, believing that the experiences I have thus added to my former knowledge, will render me none the less efficient. Residence one block above Dickson's mill."

It was in 1866 that Dr. Twitchell identified himself most actively with the promotion of medical science locally by joining with a small group of physicians in organizing the Fillmore County Medical Society, at a meeting held on October 17 in the office of Dr. Lafayette Redmon in Preston. Dr. Twitchell was the first president of the society and he held the presidency for several consecutive terms, during the important organizational period and through 1869, in which year the state legislature, on March 9, approved an act directed at the elevation of medical practice in the state. In this period of professional prominence Dr. Twitchell was known in the county as a public speaker of ability on medical subjects; notices of his lectures, which were given without charge, appeared from time to time in the newspapers. In 1871 he became a member of the Minnesota State Medical Society, which had been revived in 1869, and in 1879, co-operating with the State Board of Health, he was one of the eleven physicians of the county who supplied data for the official reports on the incidence of diphtheria. The chief of his earliest medical contemporaries in Chatfield was Nelson W. Allen, Isaac S. Cole, Luke Miller and Augustus H. Trow. In 1869 came H. Thomas and from the seventies on into the nineties there were many others, some of whom stayed a short time and some for many years. A few of them were John C. Dickson, Milton A. Trow, John C. Fate, Aaron M. Stephens, Florence J. Halloran and Charles McH. Cooper.

Although after the Civil War Dr. Twitchell resumed his medical practice and related activities, his health had been so depleted by his arduous military service that he no longer could carry on all of the strenuous duties of a country practitioner, and as time went on he became increasingly engaged in occupations other than medical. In the early eighties this physician entered seriously into civic affairs, especially in the legal department, serving various terms as village justice; the last time, in 1887, he was named thus in a special act of the legislature incorporating the City of Chatfield.

In 1885 Mrs. Twitchell, because of her failing health, moved from Chatfield to Santa Barbara, California, and her daughter Carpie soon followed to be her attendant and companion. Dr. Twitchell, who also was now almost an invalid, remained for a few years in the rambling old homestead with the daughter Arna and a little granddaughter, Anna Spencer Twitchell, whose mother had died, but in 1891 these three moved permanently from Chatfield to Hamilton, Ohio, the home of Dr. Herbert E. Twitchell. A year later Dr. Refine W. Twitchell joined his wife in California, and there he died on October 9, 1893; Martha Carpenter Twitchell passed away on June 17, 1896; both are buried in the beautiful cemetery on the outskirts of Santa Barbara, overlooking the ocean.

Of the five children of the family, it has been stated that Steven died in infancy. Sarah Edna, the eldest, a graduate of the University of Minnesota, an able teacher in the schools of Minnesota and South Dakota and a successful business woman, for a time proprietor of the Flandreau Roller Mills, died in Flandreau, South Dakota, on December 25, 1901. Carpie was married to William C. Hall; Mr. and Mrs. Hall lived at different times in Santa Barbara and Long Beach and, finally, in Los Angeles. Arna became Mrs. William J. Broome; Mr. and Mrs. Broome lived in the East until

1911, since when they have made their home in Los Angeles (1943). Herbert E. Twitchell, M.D., died at Dayton, Ohio, in 1929.

In Chatfield there are those yet living who recall Dr. Refine W. Twitchell as a man of kindly and strong personality, a physician wise in his day, gentle with his patients and in his family, intrepid in the line of duty and service, civic and professional.

**John Darwin Utley,** born in 1866, a graduate of Rush Medical College in 1890, was licensed on July 8, 1892, to practice medicine in Minnesota and soon afterward he filed his certificate in Fillmore County. In that summer Dr. and Mrs. Utley came from St. Croix County, Wisconsin, to Spring Valley and established their home in the village. Their only child, a daughter who died in infancy, was born in Spring Valley.

For the greater part of twenty-four years, as nearly as can be determined, Dr. Utley followed his profession in the community, building up an excellent medical and surgical practice and holding the confidence of his patients and associates. Well into 1916 he was active in the Southern Minnesota Medical Association, which he had joined early after its organization in July, 1892, and also in the Houston-Fillmore County Medical Society, which was formed in May, 1904, giving papers at the meetings and serving on committees. In July, 1916, the *Journal-Lancet* announced that Dr. J. D. Utley of Spring Valley had taken over the Midway General Hospital between Minneapolis and Saint Paul and would continue its work, and he presumably left Spring Valley early in that summer.

In December, 1918, *Minnesota Medicine* carried an item stating that Dr. Utley, of Saint Paul, recently had been appointed a captain in the Medical Reserve Corps and had gone to Camp Cutler, Battle Creek. In the early twenties Dr. Utley, by then a resident of Minneapolis, left Minnesota for California; Mrs. Utley had died not long after they had moved from Spring Valley. For his first year or two in California Dr. Utley practiced medicine in Ocean Park, for the next six years in Montrose, and since 1931 he has been in La Crescenta (1943).

**G. H. Vance** was in the village of Fillmore, in Fillmore Township, in the early eighties, judging from a single entry (1880-1881) in the *Minnesota State Gazetteer and Business Directory.* His name was not found in any other directory, general or medical, nor has other reference to him been observed.

*(To be continued in the February issue.)*

**A. E. CARDLE, M.D.**
**President, Minnesota State Medical Association**

# President's Letter

The Minnesota State Medical Association enters a new year in its progress. We should look forward to the coming year as a time for service to all. Important problems lie ahead. While at times great difficulties may arise, I have no doubt that with such a splendid membership as is possessed by our Association, whatever problems face us will be solved with purpose and wisdom. The privilege and honor to serve this membership as president is deeply appreciated.

As Sixth District councilor, I learned the value of the great instrument which our State Association has become, an instrument through which every doctor in Minnesota has an extraordinary opportunity to exert influence for the public good. That may seem like a broad statement to make, but let us analyze it for a moment—let us examine this instrument which we doctors in this state have created. Every good physician, we realize, by merely doing his job is carving himself an enviable record of "good works." The primary aim of medicine is service to humanity, particularly the relief of suffering and, if possible, its prevention. A physician who dedicates his life to that high purpose has outlined for himself a difficult assignment, one which will take an entire lifetime to complete and, even then, will never be quite finished. By joining the State Association, a physician takes on more than just his professional responsibility. He has accepted a place in the ranks of a body called "organized medicine," through which he will undoubtedly derive much personal benefit, but to which he will also have to contribute in order that it may be maintained. Physicians working individually can perform a great many social services, it is true; but physicians banded together in the cause of common good can do even more. This is the team work which is so necessary to the future of medicine. Only by so doing can we maintain the type of medical life for which we have striven. What gains have been made by organized medicine in the past have come through the unselfish service of men who have had vision. It is this vision which I hope every member in our Association can grasp. We need it now and shall need it in the days to come. The forces that are working to destroy our "way of life" must be fully understood by every member. These are serious times and need serious thought.

During my membership in this Association of ours, I have watched it become more and more a service organization. For example, countless times I have seen various groups or agencies come before our Council or our House of Delegates seeking our advice and looking to us for leadership in matters of public concern. Further proof that ours is a service organization is shown in the increasing number of problems undertaken by our hard-working scientific and economic committees. Rural health, nurse shortage, disease control, extension of medical service and other perplexing problems are under intensive study at the present time. Through the combined efforts of every member of the Association, these problems can one day be solved. Not only is there determination to work together within our own ranks, but there is also increasing evidence of a desire to unite our efforts with those of the other professions which are a part of the health service picture. We are just beginning to realize the tremendous possibilities of a joint-attack by all of the allied health professions on the problems that beset us. This, then, is the instrument which we have created—an organization through which we can pool our resources so as to amass sufficient strength to overcome the obstacles lying between us and the goals to be achieved.

In anticipating what lies ahead in the coming months, I am grateful for the fine spirit of cooperation which has been so carefully developed and encouraged by my predecessors in office. The officers who will serve you in the coming year fully appreciate the honor which has been accorded them. They will serve you faithfully and well, as their predecessors have done. They wish to know all of the needs of the Association and its members. As one of these officers I look forward to the pleasure of becoming more intimately acquainted with the component medical societies and their members.

My best wishes to you all for a happy, successful and progressive year.

A. E. Cardle

Minnesota State Medical Association

# Editorial

CARL B. DRAKE, M.D., *Editor;* GEORGE EARL, M.D., HENRY L. ULRICH, M.D., *Associate Editors*

## NEW YEAR PROBLEMS

AS we start the New Year, there is one outstanding need which towers over all others in its significance and that is the crying need for implementing the United Nations with an international force which will be effective in preventing war. All other needs—international or national—important as they are, are second in importance. If, in the setup of the United Nations, this cannot be accomplished, another organization which will provide an effective police power to prevent military aggression by any nation in the world, with membership open to all nations, seems to be the only answer. Another war involving the use of atom bombs, whose destructive power has been developed a hundredfold since the war, is unthinkable. Release, too, from the need of large military armaments would enable nations to devote their major energies towards reconstruction, for which there is such a woeful need today.

While we do not hesitate to express an opinion on the United Nations, the Marshall Plan is a controversial subject, involving continued shortages, continued high prices and high taxes in our country, and control of expenditures in foreign countries with eventual overproduction and probable repetition of the 1929 collapse.

On the home front there is the possibility that the Wagner-Murray-Dingell Bill will again be submitted for Congressional action. This, in our opinion, will be the most important decision Congress may be called upon to make. The fate of the bill will decide whether socialism in this country is to be extended to include medical practice or not.

Perhaps next in importance in our home economy is the need for a great reduction in the cost of our government. The innumerable bureaus in Washington and federal subsidies of states for activities which should be financed by the states themselves only serve to maintain taxes at rates which prove burdensome to all income groups and prevent financing of new industries. The government can do its part in breaking the vicious circle of high taxes, high wages, high costs of commodities, and high cost of government. Labor can do its part by going to work.

Our country with its vast resources and private initiative has always been able to meet both economic and political crises successfully. This has involved considerable muddling on occasion when economic laws have been interfered with. It is to be hoped that our law makers have come to realize that economic laws cannot be broken with impunity.

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## AMERICAN ACADEMY OF GENERAL PRACTICE

THERE has been a widespread feeling among general practitioners for some time that some steps should be taken to dignify their professional status. The great majority of M.D.'s are engaged in general practice, and they care for the majority of individuals who seek medical advice. While a section on General Practice in the American Medical Association was established at the San Francisco meeting in 1845, no nation-wide organization of general practitioners had made much progress until the American Academy of General Practice was founded June 10, 1947, by the officers and members of the Section on General Practice of the AMA on the occasion of the AMA meeting at Atlantic City. Although members of the new Academy must be members of the AMA., the organization is independent and distinct. The Academy, however, asserts its intention to support the AMA in every way.

The following quotation from the Constitution will clearly show the purposes for which the Academy was founded:

1. "To promote and maintain high standards of the general practice of medicine and surgery.
2. To encourage and assist young men and women in preparing, qualifying, and establishing themselves in general practice.
3. To protect the right of the General Practitioner to engage in medical and surgical procedures for which he is qualified by training and experience.

4. To assist in providing postgraduate study courses for General Practitioners, and to encourage and assist practicing physicians and surgeons in participating in such training.

5. To advance medical science and private and public health."

Qualifications for membership in the Academy include a state license to practice. Actual participation in general practice for at least three years, high moral and professional character, a year's rotating internship in an approved hospital or the equivalent in postgraduate training. That membership shall mean more than simply joining the organization, members will be required to devote at least 150 hours during every three-year period to postgraduate study—credit to be given for attendance at various medical meetings. Provision is made in the By-Laws for the establishment of state and county branches. An initiation fee of $10.00 and yearly dues of $15.00 are stipulated. An application for membership form may be obtained from Dr. Stanley R. Truman, Secretary, 1904 Franklin Street, Oakland 12, California.

The American Academy of General Practice is said to be growing rapidly in membership. The purpose of bettering general practice, for which the Academy was founded, is beyond reproach. If the Academy can stimulate the establishment of more postgraduate centers for general practitioners, with resulting greater attendance at county, state, sectional and national meetings, its existence will be justified. If not, it will have no *raison d'être* and will eventually fall into a state of innocuous desuetude.

## MINNESOTA HEART ASSOCIATION PROGRAM

WITH diseases of the heart and circulation generally conceded to be the most important unsolved problem of medicine, it is intended that a major part of the program of the Minnesota Heart Association will be designed to provide supplemental educational aids for the medical profession.

It is intended that those aids should be provided through publications, pamphlets and the services of a Speakers Bureau, personnel of the Bureau to be available upon request of any county medical society for informal discussion of the problems of cardiovascular disease and emphasizing a progressive, objective approach toward reduction or possible elimination of those problems.

It is also intended in the program of the Minnesota Heart Association to stimulate research, both at the University of Minnesota and in smaller communities where facilities are available for clinical research along lines of clinical evaluation of advances in knowledge in cardiovascular disease.

To initiate and carry out the program of the Minnesota Heart Association, certain inevitable expenses are involved. They include costs of office space and equipment, clerical help, printed material, postage and other incidental charges, especially during the critical 1948 organizational period.

Meanwhile, the participation of Minnesota physicians as members of the Minnesota Heart Association can well mean the successful operation of the program. As members, physicians of Minnesota will also be adding their interest and voice to the development of the Association.

The eleven Minnesota physicians and five laymen who constitute the Board of Directors of the Minnesota Heart Association as it now exists (operating from the 20th Floor, Medical Arts Building, Minneapolis 2) are hopeful that other physicians in the state will promptly aid the program through their participation as members, since medical practitioners in general would stand to benefit by development of a program aimed at supplemental medical education in cardiovascular disease.

As Dr. L. A. Buie announced in his President's Letter in the October, 1947, issue of MINNESOTA MEDICINE, the Council of the Minnesota State Medical Association has approved the organization of the Minnesota Heart Association.

PAUL F. DWAN. M.D.
*President, Minnesota Heart Association*

## GERMAN MEDICINE

AN account of what appears to be a very reliable investigation of medical research and training in Germany under the Nazi regime, including the war period, has appeared recently.* The question has arisen in our mind as to what, if any, valuable scientific facts were learned as a result of the sadistic experiments carried out on the thousands of helpless individuals in Germany under the Nazi regime in the name of science. This article answers the question.

It seems that the Technical Intelligence Di-

*Roueche, Berton, Zweckwissenschaft. The New Yorker, August 9, 1947

vision of the U. S. Department of Commerce sent a representative to Germany following the war to ascertain what developments in science, including medicine, the Germans had made during the war. They chose Hans Lowenbach, associate professor of neuropsychiatry at Duke University in Durham, North Carolina, as their investigator. He is a native of Dusseldorf, received his medical training in Germany, and was doing research in the Kaiser Wilhelm Institute in Berlin, when on June 3, 1934, Hitler's blood purge took place. Having some Jewish blood in his veins, he escaped after considerable difficulty to Norway, spent several months in Norway, and then served for three years as a ship doctor on a Norwegian whaler. With the help of friends at Johns Hopkins, he came to Baltimore in 1938 on the German quota from South Africa and obtained a job in research at Johns Hopkins. In 1940 he joined the faculty at Duke University.

Dr. Lowenbach made an exhaustive investigation of the scientific research which had been going on in Germany during the war. He reports that medical research during this period had been restricted by order to only those matters which might have a practical application—Zweckwissenschaft, so called. Research for research's sake was entirely abandoned. He lists eleven papers published during this period, all of which were of only passing interest. These included one in an artificial hand; a new method of steriling agar-agar; a survey suggesting that stocky individuals stand a hot, dry climate best; and analysis of structural abnormalities found in the brains of persons suffering from congenital mental disorders. Compared with the developments attained in our country during this period, such as penicillin, sulfadiazine, blood plasma, the Rh factor, et cetera, they seem insignificant. The results of the barbarous experiments on human beings have been absolutely nil and merely provided a sadistic delight to those who perpetrated the atrocities.

Dr. Lowenbach reports that the medical training under the Nazi regime has been of poor quality. All that is left of German medicine is a handful of old men. The younger men are provincial in their medical knowledge and complacent in their idea that the brilliant period in German medicine has not come to an end. His description of a brain operation performed in Munich at which he was a spectator, the diagnosis wrong and no provision being made in advance for a blood transfusion, suggests the type of surgery being practiced in Germany today.

To German scientists goes the credit of the first experimental work with sulfanilamide in December, 1932. It had first been synthesized in 1908. The first report of its clinical use was made by Domagk in an article in the Deutsche Medizinische Wochenschrift of February 15, 1935. This was before the Nazis took over in Germany. The development of the other sulfa drugs was accomplished outside of Germany, notably in England and America.

## DIRTY LINEN AIRED

RECENTLY two articles appeared in *The Reader's Digest,* calling attention to certain reprehensible practices which are taking place in medical practice. None of those mentioned is new, and the profession has voiced its disapproval of such practices for years. How extensive they are and how many members of the profession are involved, we are unable to say.

The splitting of fees has always been frowned upon by the medical profession. Such a practice might well involve bidding for patients by the specialist, with higher fees charged by the specialist, and is bound to influence the referring physician in his choice of consultant. While the practice doubtless exists, we question whether it is widespread.

According to *The Reader's Digest,* the practice of rebating part of the cost of eyeglasses to the oculist by the optician is widespread, and the manufacture of lenses is in the nature of a monopoly. If so, the medical profession should take active steps to put an end to what amounts to fleecing the public by certain members of the profession.

As to the accusation that too many needless operations are performed, this cannot be denied. The figure of 9,000,000 a year is undoubtedly a gross exaggeration. There are many borderline cases where there is room for an honest difference of opinion. This applies particularly to the tonsil and appendix operations, which lead the list. It is the operations performed for revenue only that should be heartily condemned, and each hospital must be the guardian of the public by preventing such crooked procedure.

It is not pleasant to have our dirty linen aired. The way to prevent such criticisms is to keep our linen clean.

# Miscellaneous

## THE CLINICAL PATHOLOGIST VERSUS THE STATE HEALTH LABORATORY

During the annual session of the Minnesota State Medical Association, held at Duluth in July, 1947, the House of Delegates passed a resolution petitioning "the State Board of Health to include in its laboratory service Rh typing in order to make this service readily available to all practicing physicians."

This action was taken apparently without having given due consideration either to the fundamental merit of the proposition, or to the sentiments of the practicing clinical pathologists who hold membership in the Association.

The clinical pathologist objects to the resolution on the following grounds:

(1) The clinical pathologist, a fellow practitioner and member of the Association, who is materially affected by this resolution, had not been consulted before it was acted upon. The Rh determination is admittedly a laboratory procedure, and as such, it belongs in the sphere of the practice of clinical pathology.

(2) The Rh determination is not an emergency measure affecting public health, nor is it related to the control of communicable diseases. It can be carried out in the usual course of practice in any existing laboratory.

(3) The Rh determination by the state laboratory would invariably lead to blood grouping in general, as well as the Rh typing of male members of the population, since they are closely related in transfusion practice.

(4) The newly married or pregnant women may have their Rh determined at any time, not by the state laboratory as a public health or emergency measure, but by a private laboratory purely as a routine procedure.

(5) The technique of Rh determination is as simple as that of blood grouping and cross matching, since potent and reliable anti-Rh sera are now plentiful. The difficulty encountered in the past which probably prompted the resolution, was due mainly to the scarcity of reliable anti-Rh sera. This situation no longer exists, and all technicians who are trained to do blood grouping can perform the Rh test with equal skill and accuracy. The only caution suggested, here, would be that facilities for consultation should be made readily available in doubtful or important cases.

(6) The clinical pathologist claims that, since the Rh determination is within the sphere of his specialty, he may rightly expect a revenue from the performance of these tests for the practitioners. To deny him this right by the official action of his fellow practitioners would seem uncalled for, since there are a number of clinical laboratories throughout the state, directed or advised by a qualified clinical pathologist,† which are equipped to render not only the simple Rh determination but the more complicated serological procedures which may be required in the diagnosis and treatment of cases suffering from Rh incompatibility. It should be emphasized here that the clinical pathologist is fully cognizant of his obligations to the indigent and would gladly offer his services to him without cost whenever requested to do so.

### Discussion

The clinical pathologist is a practitioner of medicine in the same sense as any of the members of other specialists. He is entitled to the support and protection of organized medicine. His future destiny may affect the destinies of all other members of the medical profession.

Unfortunately for the professional and economic security of the clinical pathologist, the diagnostic services of the state laboratory in infectious and communicable diseases in recent years has developed to such an extent that the medical profession looks to it more and more for aid in laboratory diagnosis, not only because of the excellent service it renders, but because of the elimination of the expense which it otherwise entails. The practice is now so universally appreciated, there is a tendency on the part of the practicing physicians not only to take full advantage of the present facilities of the state laboratory, but to advocate the extention of its services to include all diagnostic tests in order to "cushion" the cost of such services to the patient, ignoring completely the place which the clinical pathologist occupies in the practice of medicine. Coupled with this unfortunate trend is a more fundamental, yet less appreciated, fact that the field of clinical pathology and laboratory medicines, by its very nature, conveniently furnishes a fertile soil for the propagation of the seed of state controlled medicine, and that, combined with the public health aspects of the medical practice in general, the state laboratory may become the spearhead of socialized medicine, which may eventually affect not only the practice of clinical pathology, but that of radiology, pediatrics, obstetrics, or any other specialty.

This situation which threatens the very existence of the clinical pathologist as a medical specialist, and which, indeed, denies the principle of free private enterprise to a group of practitioners, is probably an important factor in the present scarcity of clinical pathologists. Young graduates are hesitant and cannot easily be persuaded to specialize in clinical pathology, since they realize full well the future of the specialty seems uncertain and uninviting.

This means that the smaller hospitals and communities will continue to be deprived of adequate clinical laboratory service except through the facilities of re-

This article was prepared at the suggestion of the Council, to enlighten the position the clinical pathologist takes on the diagnostic laboratory services rendered by the State Board of Health Laboratory, with special reference to the Rh determination. The opinions expressed, however, are the author's own.

†A list of practicing clinical pathologists in the state will be furnished upon request.

mote metropolitan laboratories, or through the services of the state laboratory.

In order to remedy this unsatisfactory situation, and to obtain adequate and on the spot laboratory service for rural hospitals and practitioners, and in order to uphold the principle of private enterprise for all, the clinical pathologist would propose to interest young medical graduates to enter into the specialty by assuring them of a productive field from which they may derive an attractive and satisfying practice, without the fear of "competition" from the state laboratory. To that end, he would suggest the establishment of a number of local community health centers in various parts of the state, each including a well-equipped hospital with adequate laboratory service under the direction of a trained clinical pathologist, who should be afforded an opportunity to personally serve local physicians and who, for economic reasons, may supervise several neighboring laboratories within the radius of 25 or 50 miles. This should give adequate, individualized laboratory service to all sections of the state. Moreover, he should be encouraged to avail himself of the facilities of the Department of Pathology of our Medical School for consultation, and to act as advisor and supervisor of an educational program for the local physicians whom he serves.

If this proposal were carried out, it should become unnecessary for the state laboratory to perform such diagnostic procedures as the Rh determination, tumor diagnosis, and the like, which certain public health officials and socially minded physicians are advocating, and might mean a definite deterrent to a threat of socialized medicine. It should stimulate initiative and incentive in the clinical pathologist, to fully equip his laboratory to render such diagnostic services as the state laboratory might otherwise render.

The clinical pathologist recognizes the leadership and the ability of the Minnesota State Board of Health Laboratory in research and diagnosis, by reason of the high qualifications of its scientific personnel and the economic advantages it enjoys. He looks upon it as a consultant and final authority in public health laboratory diagnosis. He recognizes the peculiarly desirable place it commands in promoting research and publicity relating to diseases which are of utmost public concern. He appreciates a healthy influence it exerts upon the practice of medicine in general and clinical pathology in particular. Such undertakings as the serologic evaluation program for participating laboratories currently being carried out, the statistical cancer survey service now being inaugurated, and other practical investigations dealing primarily with public health, are welcome contributions which the state laboratory can make without actually entering into the practice of medicine.

The clinical pathologist feels that where public health is not of immediate concern, clinical laboratory services should be left in his hands, and that he should not be placed in the role of a competitor in the practice of his specialty against the state operated laboratory. To burden the state laboratory with diagnostic tasks which primarily belong to the clinical pathologist might seem wise and expedient to some physicians, and a welcome sign to the advocates of socialized medicine. It would be accomplished, however, only at the sacrifice of a principle on which American medicine rests, and from which there should be no retreat.

KANO IKEDA, M.D.

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## MINNESOTA ACT RELATING TO LICENSED PRACTICAL NURSES

The law defines the practice of nursing by a licensed practical nurse as "the performing for compensation or personal profit, services required in the nursing care of the sick, not involving the specialized education, knowledge, and skill required in professional nursing." The law states in part: "It shall be a misdemeanor for any person to practice nursing as a licensed practical nurse in this state unless such person shall have first obtained a license from the Board, but this act shall not prohibit any person from nursing the sick for hire, who does not in any way assume or represent to be a 'licensed practical nurse.'"

The following is general information regarding the minimum qualifications for applicants for State Board examination and licensure as licensed practical nurses:

1. *Age.*—Applicant must be eighteen years of age or over.

2. *Character.*—Applicant must be of good moral character.

3. *Personal Fitness.*—Applicant must have a pleasing personality, give attention to own personal hygiene, show a sympathetic understanding of patients' problems, and have an appreciation of her own limitations, but possession of sufficient self-reliance to inspire confidence in the family.

4. *Health.*—Applicant must be in good physical and mental health.

5. *Education.*—Applicant must have completed at least an eighth grade education or its equivalent as determined by the State Department of Education.

6. *Practical Nurse training.*—Applicants might qualify for examination for licensure if they have had practical nurse training or the equivalent as indicated in one of the several groups below:

(1) Completion of and graduation from a program for the training of practical nurses which has been accredited by the Minnesota State Board of Examiners of Nurses; such a program to be not less than nine months in length.

**Equivalents Effective for the Year 1948**

(2) Completion of a systematized course of instruction and supervised experience in the care of the sick, of at least nine months' length; course not accredited by the Minnesota State Board of Examiners of Nurses; such a program to be evaluated by this board.

(3) Former student in an accredited school of basic

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# MEDICAL ECONOMICS

**Edited by the Committee on Medical Economics**
**of the**
**Minnesota State Medical Association**
**George Earl, M.D., Chairman**

## BARUCH PROPOSES PLAN FOR HEALTH INSURANCE

Speaking before a meeting in New York recently, Mr. Bernard M. Baruch, wartime economic stabilization director, presented his own theories about what this country needs in the way of health insurance. He proposed a health program to assist the medically indigent and hinted that government should be allowed its "legitimate part" in medicine.

Speaking before 600 doctors and hospital administrators at a dinner celebrating the progress of the Blue Cross plan in New York, Mr. Baruch detailed a program for improving medical and hospital services and advocated a form of health insurance for low income groups who are unable to pay for voluntary insurance such as the Blue Cross plan offers.

Mr. Baruch's proposals included the establishment of a new Cabinet post to handle health and human welfare problems. In his argument he cited American Medical Association estimates in 1939 that two-thirds of the nation's population could not afford the cost of serious illness.

### Condemns Medical "Rear Guard Action"

Too long, Mr. Baruch declared, doctors have been "fighting a rear guard action." He was expressing dissatisfaction with the medical profession's program to provide adequate medical care. Several eastern newspapers played up Mr. Baruch's remarks and some of them suggested that the medical profession needs further stimulation in its efforts to avoid socialization. Mr. Baruch (who is the son of a physician) implied that the voluntary medical service plans now operating are too costly for the low income groups. For them he boldly endorsed some form of compulsory health insurance, financed through payroll deductions, with some government aid and with the patient retaining the right to choose his own doctor.

On the surface, Mr. Baruch's plan may appear harmless, but a second glance reveals the possibility of serious consequences. The payroll deductions would be very small, true, but they would be supplemented by employer and government so as to total a figure much higher than that which medical costs ever would reach under the voluntary system. The high cost of administering the program would absorb a greater share of the funds collected and only a relatively small amount would remain to pay for medical services rendered.

Then, too, it is known that payroll deductions will mean even less take-home pay than ever for the lower income groups. That will surely stimulate organized labor to demand further wage increases and will up production costs and the price of goods to the consumer. Thus begins a vicious circle which will widen continually until costs are all out of proportion to the original deductions taken out for the prepay program.

### The Voluntary Way Is Cheaper

Figures bear out the contention of the medical profession that the voluntary method of enrolling subscribers in plans for budgeting the cost of medical and hospital care is much cheaper than compulsory government-administered plans.

The sincere effort that organized medicine has made to promote and extend prepayment medical care plans can be cited as positive proof that medicine is not on the defensive, nor is it "fighting a rear-guard action."

To those who complain that the rising cost of medical care is putting good health out of reach of the majority of our people, medicine has this to say: Medical care is expensive and is becoming more expensive; yet, in comparison to the national income, it is a shrinking item.

An analysis of the cost of medical care has been made by the American Medical Association Bureau of Medical Economic Research, which

presents facts and figures to prove that statement. It further points out that patients nowadays are getting far more for their money in terms of longer life than they ever got before.

### Trend Is Toward Compulsion

Mr. Baruch's proposals are only one example of the tendency of many of today's deep thinkers to arrive at the conclusion that compulsion is the answer to our social problems. Mr. Baruch explains that "all law imposes compulsion." With that as a base line he then cites government's part in education and housing and suggests that government should also handle medicine in a like manner. With all of that he still maintains that he is opposed to socialization since "it leads ultimately to the police state, degradation of the individual and lessened well being." Right there Mr. Baruch has refuted his own argument, but medicine has an even better, more concrete answer.

In reality, just because people are compelled to set aside so much for medical emergencies, it doesn't necessarily follow that they will be in any better position to do so. If two per cent of a worker's income will supply him with complete hospital and medical service for himself and his family, and he is unable to give up such a small amount out of each pay check voluntarily—will he be more able to pay under a compulsory system?

Those unable to pay their own hospital and medical bills are today able to secure services free. Physicians generally supply care where it is needed and charge moderately when the patient has modest means—and not at all when the patient is in financial straits.

### "What of the Little Fellow?"

Mr. Baruch insists that none of the prepay plans so far advanced—other than the so-called "compulsory health insurance"—provide for the low-income group. Some can afford voluntary health insurance, Mr. Baruch says; but, he asks, "What of the little fellow?" Mr. Baruch might well consider that that "little fellow" (who makes up about two-thirds of our population) affords the government a tremendous source of revenue. Furthermore, persons who live within their means, as all people should, will be able to provide ordinary medical care for themselves.

Mr. Baruch proposes to protect the little fellow with a strong, centralized, paternalistic government health program. Does he not realize that health programs are best administered locally as dictated by the needs of the individual community? Can he not foresee the possibility of such a system working ill to that very man he is proposing to help—the little fellow?

## EXPERIMENT IN GOVERNMENT CONTROL OF MEDICINE FAILS

A couple of months ago, when an order came to cut down on services to subscribers in order to stretch a shrinking budget, San Francisco doctors gave up trying to support the Health Service System of that city, which had been in operation about ten years.

The doctors began resigning *en masse,* refusing to deviate from good medical practice. Said the physicians (both members of the San Francisco Medical Society and nonmembers alike): "We can take cuts in our fees, but we won't cut the quality of medical care!"

The Health Service System of San Francisco was created by the voters in 1937. The plan made it compulsory for the city's 12,000 employes to enroll in the plan; their dependents could elect to participate, or not, as they desired. Payroll deductions covered the premiums, and average monthly payments were around $3.40.

### Plan Financially Unbalanced

The plan's financial base was extremely shaky and countless times the San Francisco County Medical Society warned of impending disaster and suggested reforms. In fact, the plan lost $37,578 last year despite its earned income of $529,330. In an attempt to regain its bearings, the Health Service System increased its premium rate 25 per cent. That had to be done even though physicians were only being paid 85 cents on a dollar.

The final attempt to keep the plan going was the plea to participating physicians from the medical director of the Health Service System: "Reduce your services!"

Physicians can surely make diagnoses without so many laboratory tests and x-rays, the medical director of the plan declared in his statement to the doctors. He reported that the results of several hundred examinations, particularly reports from x-ray laboratories, had been surveyed and

the conclusion had been drawn that from 50 to 60 per cent of these tests were unnecessary.

The medical society answered by pointing out the folly of taking chances on improper diagnoses just to cut operating costs. It further showed that x-ray and clinical tests amounted to a total of $33,944 during the year—hardly enough to account for a deficit of more than $37,000.

Thus has ended another "shining example" of government medicine.

## AMA INTERIM SESSION AIMED AT GENERAL PRACTITIONER

The annual interim session of the American Medical Association in Cleveland, January 5 to 8, promises to provide unusual opportunities for postgraduate education and for discussing problems which beset the general practitioner.

Meetings to be held include the AMA House of Delegates, the Council on Industrial Health, the National Conference for County Medical Society officers and a special Midwest Regional Conference of the Council on Medical Service.

The AMA delegates meet the first two days, January 5 and 6 to transact Association business. At the same time Industrial physicians and others concerned with industrial health will convene for their Eighth Annual Congress. General practitioners supply a large part of the medical services which workers receive through industry and they are being invited to attend the sessions. The program has been constructed with the general practitioner in mind and will include discussions of first aid in emergency services in industry, physical examinations, administrative practices, applied physiology, aviation medicine, radiation medicine and practical expositions of occupational disease management, traumatic surgery and rehabilitation.

### "Grass-Roots" Conference Meets

A second of the highly successful "Grass-Roots" Conferences of County Medical Society officers will be held on Tuesday evening, January 6. It will be devoted primarily to the problems of general practitioners—how to create more of them, how to uphold their prestige and their role as leaders in the community.

The AMA scientific program, to be presented beginning Wednesday morning and continuing two days, will be devoted to subjects of current interest and again slanted toward the doctors in general medicine. Each session is to be supplemented by panel discussions where doctors will have full opportunity to present individual questions they may have.

Four speakers on the program are from Minnesota: E. H. Rynearson and Albert Snell, Rochester, and C. D. Creevy and L. G. Rigler, Minneapolis.

On Wednesday the newly created AMA gold medal award to the outstanding general practitioner of the country will be presented. The AMA reports that hundreds of nominations have been received from state medical associations and various community and civic organizations. Biographies of the three top candidates selected by the executive committee of the Section on General Practice and the Board of Trustees will be submitted to the House of Delegates, which will choose the recipient on Monday morning.

### Midwest Regional Conference

On Sunday, January 4, the day prior to the opening of the AMA interim session, the Council on Medical Service will hold a Regional Conference, with representatives from the six states of Illinois, Indiana, Kentucky, Michigan, Ohio and West Virginia. The AMA has announced that these regional conferences have been highly successful and is planning to hold them from time to time.

Another AMA-sponsored conference is coming up in February which is being watched with interest because of the vital problem with which it deals. This year marks the third of the series which is coming to be an annual event. This conference is the Conference on Rural Health to be held February 6 and 7 in Chicago.

Farmers and doctors are establishing by means of this conference a working liaison and the exchange of ideas and opinions at these conferences show promise of accomplishing a great deal in the rural health problem in the near future.

## COUNTY OFFICERS MEETING

Officers of the component medical societies of the Minnesota State Medical Association will convene for their annual meeting at Hotel Lowry in Saint Paul on Saturday, February 28. Among the important topics to be considered will be an up-to-date progress report on the Minnesota Hospital Survey and Construction program, in which physicians in the state are vitally interested.

## MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

**230 Lowry Medical Arts Building**

**Saint Paul, Minnesota**

**Julian F. DuBois, M.D., Secretary**

### Saint Paul Woman Pleads Guilty to Forging Narcotic Prescriptions

*Re United States of America vs. Frances C. Zink*

On November 7, 1947, Frances C. Zink, forty years of age, who gave her address as the Lowry Hotel, Saint Paul, Minnesota, entered a plea of guilty in the United States District Court in Saint Paul, before the Honorable Robert C. Bell, to an information containing two counts of violations of the Federal Narcotic laws. Judge Bell suspended the imposition of sentence and placed the defendant on probation for five years on condition that she remain in the custody of the United States Marshal and be taken to the United States Public Health Service Hospital at Lexington, Kentucky, for treatment for drug addiction.

The defendant was arrested on October 18, 1947, by Saint Paul police officers after she attempted to have a forged narcotic prescription filled at a Saint Paul drug store. The druggist became suspicious because the defendant had sent a seventeen-year-old girl with the prescription. The investigation disclosed that the defendant had stolen prescription blanks from at least three Saint Paul physicians, and according to the Federal Bureau of Narcotics, had forged approximately twenty prescriptions calling for a total of 322 tablets of dilaudid in a period from September 8 to September 19, 1947.

The defendant, at the time of her arrest, was a buyer for the women's apparel department of a Saint Paul department store. Prior to coming to Saint Paul in June, 1947, the defendant had operated a dress shop at Madison, Wisconsin, for several years.

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### Saint Paul Woman Convicted of Shipping Misbranded Drugs in Interstate Commerce

*Re United States of America vs. Carry Grace Colwell also known as Mrs. J. H. Colwell, trading as the Colwell Radium Company*

On December 16, 1947, Mrs. Carry Grace Colwell, sixty-six years of age, 257 Johnson Parkway, Saint Paul, Minnesota, was sentenced by Judge Dennis F. Donovan of the United States District Court in Saint Paul, to pay fines totaling $500, following her conviction by a jury on December 1, 1947, of shipping misbranded drugs in interstate commerce.

An information was filed against Mrs. Colwell on July 23, 1947, charging her with four violations of the Federal Food, Drug and Cosmetic Act, and particularly with those sections forbidding the shipment of drugs in interstate commerce that are misbranded or mislabeled. At the trial the Government proved that the defendant shipped radium ore to a patient in Ohio. The representations that accommpanied the shipment stated that the product was efficacious in the treatment of such diseases as cancer, tumors, poliomyelitis, Bright's disease, liver disorders, heart trouble, gall-bladder trouble, diabetes, tuberculosis, locomotor ataxia, syphilis and other ailments of human beings. Another product, radium penetrating healing balm, shipped by the defendant to a patient in Montana, was represented as being efficacious in the treatment of similar diseases. The jury refused to believe the representations made by the defendant and promptly found her guilty.

The defendant, prior to her prosecution by the United States authorities, was warned by the Minnesota State Board of Medical Examiners to discontinue her activities. Mrs. Colwell holds no license to practice any form of healing under the laws of the State of Minnesota. Unless she ceases her activities, a request will be made by the Minnesota State Board of Medical Examiners that the matter be given the attention of the state authorities.

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### MINNESOTA ACT RELATING TO LICENSED PRACTICAL NURSES

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professional nursing, although not a graduate of such a school, and having had theory and clinical experience during that time; such theory and experience to be evaluated by this board; plus at least one year's experience as a practical nurse.

(4) At least two years' experience in the care of the sick, which might include experience in hospitals registered by the American Medical Association under the direct supervision of registered nurses or licensed physicians who have given personal instruction to the applicant; or in homes under the direction of licensed physicians or under the direction of public health nursing agencies.

(5) Completion of a prescribed course in the armed forces such as: U. S. Army, medical or surgical technician; U. S. Navy, Coast Guard, or Maritime Service, as hospital apprentice or pharmacist mate; plus one year's hospital experience in the armed forces.

In sections (3) and (4) above, unless some of such experience shall have been within the five years' period immediately preceding application, such applicant may be requested to obtain a "refresher" course or more recent experience before application will be accepted. Also in sections (3) and (4) above, such experience shall have been varied in nature to qualify as equivalent to completion of a program in an accredited school of practical nursing.

When request for application blank for examination is made, please indicate under which section above you qualify. Further information and/or application blanks for examination may be obtained from the Minnesota State Board of Examiners of Nurses, 222 Minnesota Building, Saint Paul 1, Minnesota. Credentials submitted in application will be reviewed and verifications obtained by this Board.

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### BOWEL OBSTRUCTION

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evaluation, experiences and background in judging them.

In these deaths which I have reviewed, most of them were due to peritonitis. There were twenty-five cases of peritonitis (61 per cent). There were five patients who died of cardiac disease. There were three cases which were difficult to evaluate but in which death was apparently due to metastatic carcinoma. There were two deaths which were attributable to shock. One patient was a diabetic, and death was attributed to that. There were two deaths due to peritonitis and pneumonia and three due to pneumonia.

# Minnesota Academy of Medicine

**Meeting of May 14, 1947**

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, May 14, 1947. Dinner was served at 7 o'clock and the meeting was called to order at 8:10 p.m. by the President, Dr. E. M. Hammes.

There were fifty members and four guests present.

Minutes of the April meeting were read and approved.

The scientific program followed.

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## THE SURGICAL ASPECTS OF JAUNDICE

**WILLIAM H. RUCKER, M.D., F.A.C.S.**
**Minneapolis, Minnesota**

Jaundice is frequently the symptom of a condition that can only be relieved by surgery. Its treatment is definitely medical or surgical, contingent upon its basic pathology. Though its etiology is often complex and diagnosis at times extremely difficult, precise differentiation is essential if the patient is to be relieved and not injured by injudicious therapy or operative procedure.

The importance of jaundice to the surgeon is stressed by such reports as those of Snell[12] and Meyer[9] who both found approximately 60 per cent of all icteric patients amenable to surgery. That inaccurate diagnosis and incorrect treatment may be dangerous is attested to by White[21] who states that operations in cases of deep jaundice due to hepatitis or acute yellow atrophy have a mortality rate approaching 100 per cent and in cirrhosis of the liver 35 per cent. We know that ill-advised cholecystectomies may be harmful to undiagnosed congenital hemolytic jaundice patients, some 60 per cent of whom have gallstones. It is also evident that unoperated prolonged biliary obstruction leads to permanent liver damage and cirrhosis.

The surgeon will certainly make fewer inaccurate diagnoses and obtain better results, if he has a clear understanding of jaundice, its etiology, and the important methods of its differentiation. This is only possible through a knowledge of the anatomy and functions of the liver and other organs and tissues involved in its production.

The liver consists of cords of polygonal cells enclosing the bile canuliculi and surrounded by Disse's lymph spaces. The sinusoids in contact with these spaces contain the reticulo-endothelial or Kupffer's cells. The liver has a unique vascular system, in that it has two afferent blood supplies, the portal vein and the hepatic artery, and but one efferent, the hepatic veins. The hepatic artery joins with the portal vein to supply the sinusoids, thus allowing a mixture of arterial blood with the venous blood from the spleen, stomach and intestines. The sinusoids empty radially into a central vein which joins with other central veins to form the hepatic vein which empties into the vena cava. The polygonal and Kupffer cells perform the many bio-chemical processes of the liver and are intimately involved in the production of jaundice.

**JAUNDICE**

I. **Intrahepatic**
- A. *Cellular*
- B. *Cholangiolar*
- C. *Mixed*
- A. *Infections*
- B. *Poisons*
- C. *Miscellaneous Diseases*
- D. *Malignancy*
  - (a) Primary
  - (b) Metastatic

II. **Extrahepatic**

A. *Obstructive*

1. Transient
   - (a) Inflammation
     - (1) Cholecystitis
     - (2) Pancreatitis
     - (3) Duodenal Ulcer
   - (b) Spasm of Common Duct or Sphincter
2. Intermittent
   - (a) Stone
   - (b) Polypoid Tumors—Benign or Malignant
     - (1) Ducts
     - (2) Papilla of Vater
     - (3) Duodenum
3. Persistent or Complete
   - (a) Malignancy
     - (1) Primary in the Ducts
     - (2) Secondary Invasion of Ducts
       - (a) Pancreas
       - (b) Liver
       - (c) Gall Bladder
       - (d) Duodenum
   - (b) Stricture
     - (1) Congenital
     - (2) Acquired
   - (c) Benign Tumors
     - (1) Ductal
     - (2) Extraductal

B. *Hemolytic*

1. Acute
   - (a) Poisons
     - (1) Animal
     - (2) Vegetable
     - (3) Chemical
     - (4) Bacterial Toxins
   - (b) Protozoal Parasites
   - (c) Miscellaneous Hemolysins
2. Chronic
   - (a) Specific Anemias
   - (b) Congenital and Acquired Hemolytic Jaundice
   - (c) Associated Chronic Disease and Malignancy

C. *Combined Hemolytic-Obstructive*

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Jaundice is due to an excess of the bile pigment, bilirubin, in the blood stream. Bilirubin is formed from hemoglobin in the destruction of red blood cells by the reticulo-endothelial cells, particularly those of the liver, streams; hence, they are also described as regurgitation jaundice. In the hemolytic form this does not occur, and it is classified as a retention jaundice.

While these classifications are important in understanding the pathogenosis of jaundice, the surgeon will be primarily interested in whether the patient's icterus arises from a condition within or without the liver. His services will usually be of little value if the disease is confined to the liver. Therefore, some such classification as the following will be more suitable to him.

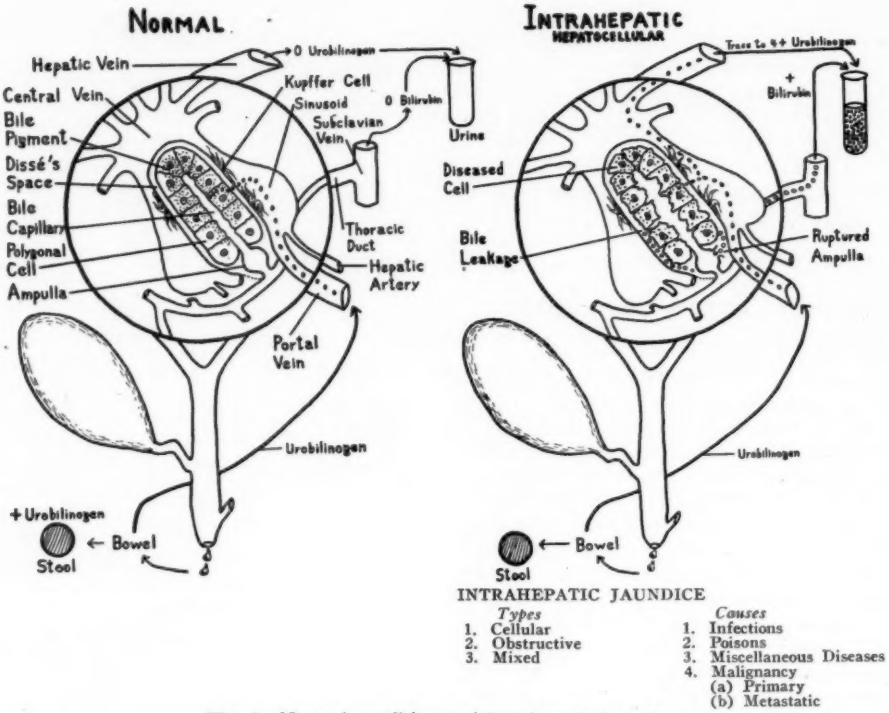



Fig. 1. Normal condition and intrahepatic jaundice.

spleen and bone marrow. Normally this pigment passes from the Kupffer cells through the polygonal cells, where it probably loses its globin radical,[16] into the bile channels. In the bile it passes through the common duct into the duodenum to be changed, later in the colon, by anaërobic bacteria, to urobilinogen. About one-half of this urobilinogen is picked up by the portal system and returned to the liver where all but a trace again passes into the bile. In order to have an excess of bilirubin in the blood stream, some intra or extra hepatic disturbance must interfere with this normal chain of events.

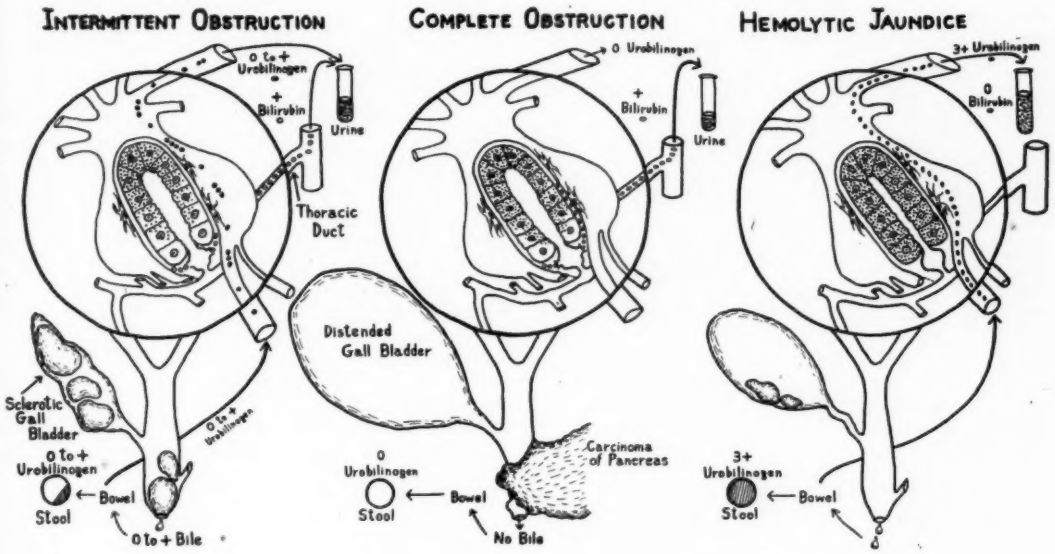
If the liver cells become diseased and normal passage of pigment from sinusoid to bile capillary does not occur, the resultant jaundice is known as hepatocellular. When the bile ducts became obstructed and the bile is backed up, the hyperbilirubinemia that results is recognized as obstructive jaundice. In the event a hemolytic agent causes such a great destruction of red corpuscles that the liver cells are unable to pass all the bilirubin into the bile channels, and the excess is left in the blood stream, we have what is termed hemolytic jaundice. Frequently, combinations occur and are identified as mixed jaundice. In both the hepatogenous and the obstructive types, bile escapes into the lymph and blood

Intrahepatic or hepatogenous jaundice may be due to diseased liver cells, obstruction of bile capillaries, or combinations of both. It may be caused by infections, poisons, and various diseases, or it may result from either primary or metastatic malignancy. In the former it may be mild, and the patient recover in a few weeks or months, or severe, and result in acute atrophy or cirrhosis. There will usually be a history of infection or exposure to a hepatoxin, no pain, an orange tinged icterus, an enlarged liver, clay-colored stools and a highly colored urine. In the advanced cases pigmentation of the skin, ascites and edema, spider naevi, pallor and mental disturbances may be present. Early in hepatitis the urine contains large amounts of urobilinogen. After jaundice appears this often drops to a small amount, to arise again as recovery takes place. Bilirubin is usually present.

The surgeon should keep in mind homologous serum jaundice because it closely simulates extrahepatic ob-

structive jaundice and may develop some sixty to ninety days following the injection of serum or plasma. Schiff[11] reports a case where plasma was used following the removal of a common duct stone and jaundice de-

mon duct or sphincter of Oddi may rarely cause a mild transient jaundice. Intermittent obstructive jaundice is usually caused by a common-duct stone, though at times a benign or malignant polypoid tumor of the




INTERMITTENT OBSTRUCTION
1. Stone
2. Polypoid Tumors
   Benign or Malignant
   (a) Ducts
   (b) Papilla of Vater
   (c) Duodenum

COMPLETE OBSTRUCTION
1. Malignancy
   (a) Primary in the Ducts
   (b) Secondary Invasion of Ducts
2. Stricture, Pancrease, Liver, Gall Bladder, Duodenum
   (a) Congenital
   (b) Acquired
3. Benign Tumors
   (a) Ductal
   (b) Extraductal

HEMOLYTIC JAUNDICE
1. Acute
   (a) Poisons
   (b) Protozoal Parasites
   (c) Miscellaneous Hemolysins
2. Chronic
   (a) Specific Anemias
   (b) Congenital and Acquired Hemolytic jaundice
   (c) Associated Chronic Diseases and Malignancy

Fig. 2. Extrahepatic jaundice.

veloped some two months later. Careful study established the diagnosis of serum jaundice and a hazardous operation for stricture or overlooked stone was avoided.

Metastatic carcinoma of the liver is probably twenty times as common as primary hepatic malignancy. Its source is usually the intestinal tract, the genitourinary organs, the breast or the lung, though it may arise from almost any tissue of the body. In both conditions weakness, loss of weight, anemia, pain, fever, edema, and ascites are common symptoms. Palpable tumors will be evident in the liver and the spleen is often enlarged. Enlarged nodes in the supraclavicular space, rectal shelf, or inguinal regions, masses in the intestinal tract or other evidences of malignancy may point to metastasis in the liver.

Operation will play the leading role in extrahepatic jaundice. It may be either obstructive, from a blockage of the large bile ducts, or hemolytic, from excessive hemolysis of the red blood cells. In the obstructive type bile may be transiently, intermittently, or persistently blocked. Cholecystitis is the common cause of transient jaundice but occasionally pancreatitis or duodenal ulcer may be the instigator. Spasm of the common duct, papilla of Vater, or duodenum has been found to be the source. Persistent exclusion of bile is usually indicative of malignancy or stricture. However, benign ductal or extraductal tumors may very occasionally prove the cause.

Carcinoma may attack the common or hepatic ducts or they may be secondarily invaded from malignancy in the pancreas, liver, gall bladder, or duodenum. Congenital atresia of the bile ducts may occur and demand operation, yet one is more frequently confronted with those strictures that occur post-operatively due to trauma or section of the common duct. Inflammation may be the cause of a benign fibrous tumor of the duct or eroding gall-bladder stones may be the source of a granuloma which causes complete obstruction of the choledochus.

Transient jaundice is rarely important or difficult to diagnose. In the intermittent type a previous history of gall-bladder stones, when considered with the relative rarity of the occurrence of polypoid tumors, will usually point to choledocholithiasis. Persistent exclusion of bile is most often encountered with either malignancy or stricture, and only very occasionally with benign

tumors. Congenital stricture should raise no problem and the history of previous operation should point to the diagnosis in the acquired type. In the great majority of cases of extrahepatic obstructive jaundice, then, differential diagnosis must be made between intermittent and complete blockage; stone on the one hand and malignancy on the other.

In the intermittent type certain rather definite findings are evident. Usually one is confronted with a middle-aged woman having a history of previous attacks of gallstone colic, stones perhaps confirmed by x-ray, her present illness being initiated by chills, fever, and colic followed by jaundice, clay-colored stools, and bile-tinged urine. Because of the intermittency of the blockage, the color of the urine and the stool, as well as certain laboratory tests, will vary. Urobilinogen will appear in the urine and stools in varying quantities from day to day, depending upon the degree of obstruction. Bilirubin will be present in the urine because bile is regurgitated into the lymph and blood streams. The liver will usually be tender and enlarged, and the gall bladder not palpable, but sclerotic and containing stones. The jaundice will often have a greenish tint and pruritus will frequently be present.

The complete obstruction of malignancy will usually occur in older males and loss of weight and weakness will be marked symptoms. Other findings will be compatible with the persistent blockage of bile; jaundice of a deep hue, pruritus, consistently acholic stools and a markedly dark urine. There will be an absence of urobiliogen in the stool and urine as no bile will reach the intestinal tract. Regurgitation of bile, however, will cause the urine to show a positive reaction for bilirubin. Pain will depend upon the location of the lesion. If the malignancy is primary in the ducts, chills, fever and colic will be evident. This is also true if the gall bladder is the primary site. When the head of the pancreas is involved, usually a dull, persistent, boring pain will be present in the right epigastrium. However, if the primary site is in the body of the pancreas, pain will be referred to the lower dorsal and lumbar regions. A dull aching pain in the right hypochondrium is complained of in carcinoma of the liver. Epigastric distress, nausea and vomiting will be symptoms in malignancy of the stomach or duodenum. On physical examination there will be a deep greenish jaundice, probably evidence of scratching and petechiae, and usually an enlarged liver and distended gall bladder. Masses and nodes may be palpable.

Hemolytic jaundice probably results, as Rich[10] states, not only from an overhemolysis of red blood cells and resultant excess of bilirubin, but also through inefficient anemic liver cells being unable to perform their normal functions. In the acute form the hemolytic agent may be an animal, vegetable, or drug poison, bacterial toxin, protozoal parasite, mismatched transfusion or other miscellaneous known or unknown hemolytic substances. In the chronic form such diseases as sickle cell anemia, Mediterranean anemia, congenital and acquired hemolytic jaundice, et cetera, occur. Also, it may be present with such chronic disorders as carcinomatosis, Hodgkin's disease, pernicious anemia and leukemia. Hemolytic jaundice is of interest to the surgeon not only because it may occur in extensive burns, mismatched transfusions and chronic and malignant diseases but principally because he can bring relief by splenectomy to those patients with congenital and acquired hemolytic jaundice.

Congenital hemolytic jaundice is hereditary and follows Mendel's law. The most generally accepted theory is that the offending hemolysin is developed in the spleen. It is a type of jaundice characterized by splenomegaly and a typical blood picture of microcytosis, spherocytosis, reticulocytosis and increased fragility of the red blood cells. The disease has active and inactive stages. The symptoms are those of anemia, i.e., weakness, dizziness, et cetera. The jaundice is a typical lemon to golden yellow and there is no pruritus. The family history, the appearance and symptoms of the patient and especially the specific blood picture and the indirect Van den Bergh reaction should make certain the diagnosis. It should seldom be confused with other forms of jaundice.

In chronic hemolytic jaundice there is such a great concentration of bile that in the majority of cases pigment stones are formed. These stones may occur in the gall bladder or bile ducts and at times cause obstruction and therefore a combined hemolytic-obstructive jaundice.

Intrahepatic and all forms of acute and chronic hemolytic jaundice, with the exception of the congenital and acquired forms, should be treated by the internist and carefully avoided by the surgeon. In the operator's field will lie the extrahepatic obstructive type and these two spherocytic anemias. As we have stated, little trouble should be encountered in diagnosing the anemias. The problem lies in differentiating the hepatogenous from the obstructive, particularly in the late cases. Obstruction of bile in time results in liver cell damage, and, conversely, prolonged hepatic cell disease causes obstruction of the bile canuliculi. Hence, as time passes, the condition approaches one of mixed jaundice, and the primary etiology towards which treatment must be pointed is lost in the complexity of the situation. This fact stresses the importance of early study and the necessity of a thorough history and physical examination and discounts the value of late liver function tests.

Steigman, Popper and Meyer[14] reported that they were able to diagnose correctly 62 per cent of all icteric patients with a complete history, a careful physical examination and one urinalysis for bilirubin and urobilinogen, and increased this percentage to 79 per cent by plotting curves of the daily estimations of these two urinary tests. The liver function tests were helpful in 16 per cent, and 5 per cent were undiagnosable.

Though it is true that meticulous clinical evaluation of the icteric patient is the most important single factor in diagnosis, the surgeon must have a knowledge not only of the simpler essential laboratory procedures and also the better established liver function tests, but also of other available diagnostic methods. He will then be able to corroborate his clinical findings, receive assistance in differentiation, follow the progress of the disease, and evaluate the condition of the liver so that

the patient may be properly prepared for operation.

Of the extremely large number of tests, many are too complicated for the average hospital laboratory and some are indefinite and confusing. An attempt is therefore made in the following group to list only those tests and procedures that are clear, essential, and not too complicated.

**Diagnostic Procedures**

1. Complete Blood
2. Van den Bergh—quantitative
3. Urine Tests
   (a) routine
   (b) urobilinogen
   (c) bilirubin
4. Stools—urobilinogen
5. Liver Function Tests
   (a) Cephalin-Cholesterol Flocculation
   (b) Thymol Turbidity
   (c) Alkaline phosphatase
   (d) Cholesterol and ester fraction
   (e) Prothrombin Time
   (f) Prothrombin Response Test
6. Duodenal Drainage
7. X-ray
8. Peritonescopy
9. Liver Biopsy.

A complete blood test, besides detecting evidence of anemia, infection, et cetera, may lead to the diagnosis of congenital hemolytic jaundice, leukemia, pernicious anemia, and other diseases.

The quantitative Van den Bergh procedure will not only give the amount of direct and indirect reacting bilirubin and differentiate regurgitation from retention jaundice, but also the total serum bilirubin. Repetition of the test will indicate the fluctuation of jaundice, thereby helping in differentiation and in determining the progress of the disease.

Routine urinalysis will determine the health of the kidney, which is of particular importance in liver damage and in the accuracy of liver function tests. The urobilinogen and bilirubin tests are simple and extremely helpful as the sketches have shown. They give much information in regard to the condition of the liver cell and bile capillary.

Examining the stool for urobilinogen tells one whether bile is entering the intestine.

Watson[15] states, "The thymol turbidity test is more uniformly negative in jaundice due to extrahepatic biliary obstruction, while the Hanger or cephalin cholesterol flocculation test is more likely to be positive in cases of parenchymal liver disease, especially cirrhosis. The thymol turbidity test is the simplest, quickest, and most reliable test, technically. If negative, however, it should be followed by the Hanger test."

Alkaline phosphatase is usually higher than 10 Bodasky units in obstructive, and less than 10 units in hepatocellular. Cholesterol is usually increased in obstructive and diminished in liver cell disease. The prothrombin test is particularly valuable to the surgeon. Prothrombin is manufactured by the liver cells. Its production is frequently decreased in both obstructive and hepatogenous jaundice and bleeding tendencies may therefore become evident. If vitamin K is given to the obstructive case, the prolonged prothrombin time will be decreased, while no relief will be obtained in the hepatic patient. This is called the prothrombin response test.

At the University of Minnesota, Watson[15] uses a chart upon which he plots the many liver function tests and thereby obtains a better over-all picture of liver function.

Examination of the duodenal contents may prove of value. Cholesterol crystals and pus will point to gallstones. Blood may indicate malignancy. Blockage at the Ampulla of Vater will diminish both bile and pancreatic enzymes, while obstruction of the common duct will interfere with the flow of bile but allow normal amounts of enzymes.

While the ordinary Graham-Cole x-ray of the gall bladder will usually be of little assistance, films of the gastrointestinal tract may show deformities or shadows of neoplasms responsible for blockage of the ducts.

Before operation is attempted in the difficult diagnostic case, peritoneoscopy and liver biopsy should be considered. In competent experienced hands these procedures have given much information and proved valuable in differentiating extrahepatic from intrahepatic jaundice.

In spite of the many methods of diagnosis now available, there will remain a number of cases in which diagnosis will be impossible. However, this percentage should remain small, if the clinician understands and uses intelligently the procedures now available to him. Perhaps the future will bring an x-ray technique capable of distinguishing these two forms of jaundice.

**Summary**

1. The surgical import of jaundice is stressed by the fact that more icteric patients are amenable to surgery than to medical therapy.

2. Whether treatment shall be medical or surgical is dependent upon accurate diagnosis, and an incorrect choice may prove harmful or even disastrous.

3. An understanding of the pathogenosis of jaundice is essential in differentiation.

4. A classification of jaundice is made from the viewpoint of the surgeon and some salient symptoms and findings of each type are discussed.

5. Though careful clinical study and simple laboratory procedures will diagnose the majority of icteric patients, nevertheless liver function tests and other procedures are necessary in the diagnosis of some 20 per cent.

6. It is evident that simpler, less confusing, and improved methods must be developed to differentiate intrahepatic from extrahepatic jaundice before all these patients can be properly diagnosed and correctly treated.

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### Discussion

DR. E. M. JONES, Saint Paul: I have enjoyed Dr. Rucker's paper very much. He has presented a subject that is of equal interest to the surgeon and the internist. The surgeon is called upon to treat individuals with extrahepatic obstruction, and the largest percentage of these obstructions are due to gallstones. As Dr. Rucker has pointed out, it is sometimes very difficult to state whether the obstruction is due to gallstones or a malignant process. I feel that, if it is at all possible, in cases with a diagnosis of malignancy causing the obstruction, an exploration should be carried out. Some years ago, I had occasion to review a large series of cases of disease of the gall bladder and the extra-biliary ducts at the Ancker Hospital. In this group two cases were found that had been diagnosed as having jaundice due to a malignant process. At autopsy the jaundice was found to be due to gallstones. Shortly afterwards another case presented a similar picture, and the same diagnosis was made. At exploration, a stone was found obstructing the common duct. The stone was removed, and the patient made a good recovery. If one such case is found in many hundreds of explorations, the exploration is well worth while. Sir Berkeley Moynihan once said that the most important person at an operation is the patient. That we are all cognizant of this is borne out by the great stress placed on preoperative care. There is no group of cases that requires more exact, painstaking preoperative care than the jaundiced patient. The results have been much better since this practice has been carried out.

DR. OTTO W. YOERG, Minneapolis: Dr. Rucker has given us a very comprehensive résumé of jaundice. I know he has given much of his time to evaluating the essentials of so large a subject.

Dr. Rucker stressed the fact that diagnosis should be made early because as jaundice progresses laboratory findings become more inaccurate.

Early operation in surgical jaundice, as Dr. Rucker stated, is important as it is well known that delay in operation leads to liver damage which is often irreparable and which may account for incomplete relief from symptoms after operation.

Hemolytic jaundice is not common and is easily overlooked. A young man of thirty-four recently came under my care complaining of weakness and of being tired. He was moderately jaundiced, but was unaware of this except that he had known that he had always been of a rather yellow color. He stated that he had consulted a number of physicians, all of whom had told him that he had gallstones and suggested their removal. Examination of the abdomen was negative and the spleen was not palpable. X-rays disclosed a large gallstone. A complete blood examination made at one of our better hospitals disclosed a hemoglobin of 40 per cent and findings of a secondary anemia. He was given parenteral liver and kept under observation for three or four weeks without change in his jaundice. A tentative diagnosis of a possible hemolytic jaundice was made and he was referred to an internist for further study which confirmed the diagnosis. I removed a 2000-gram spleen followed by the disappearance of his jaundice and a full recovery. It is of interest that blood studies of the mother, three sisters and one brother disclosed fragility of the red cells, but all were symptom free. Gallstones are present, as Dr. Rucker stated, in 50 to 60 per cent of hemolytic types of jaundice. Enlarged spleens are not always palpable and it might be well to ray the left as well as the right upper abdomen which should disclose any enlargement of the spleen if present. Accurate blood studies are, of course, essential and should be done by a well-trained careful laboratory technician.

I have enjoyed hearing Dr. Rucker's thesis which he has so ably presented.

DR. RUCKER, in closing: I want to thank Drs. Jones and Yoerg for their kind remarks. And I wish to thank the Academy for the privilege of becoming a member.

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## AN ENLARGING CONCEPT OF THE PORPHYRINS IN CLINICAL MEDICINE

### Inaugural Thesis

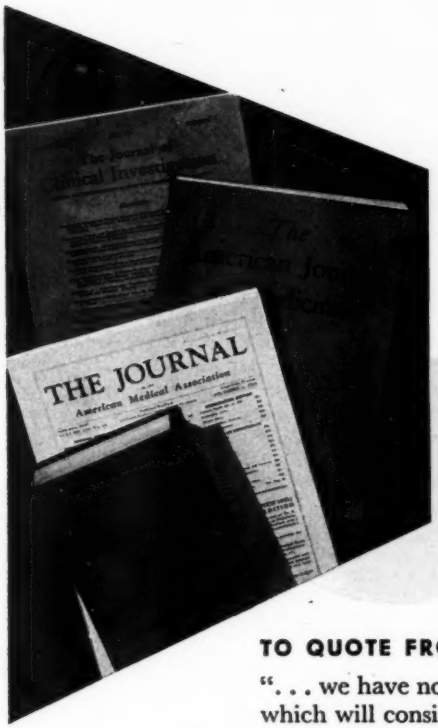
**CECIL J. WATSON, M.D.**
**Minneapolis, Minnesota**

#### Abstract

This study will include a brief discussion of the nature of the porphyrins of clinical and physiological significance: namely, protoporphyrin, the two coproporhyrin-isomers, and the uroporphyrins. The earlier confusion with hematoporphyrin and the means of distinction will be discussed. Reference will be made to simple quantitative methods for protoporphyrin, the total urinary coproporphyrin, as well as uroporphyrin and its precursor, porphobilinogen. Reference will also be made to a relatively simply method of analysis of the percentage of the coproporphyrin isomer A, which is applicable to as little as 100 c.c. of urine. This method of determining isomer distribution, depending upon differential precipitation in 30 per cent acetone in the cold, has permitted a study of coproporphyrin isomer excretion in various diseases which was not hitherto possible, because of the previous necessity of isolation of the crystalline esters from large volumes of urine, often as many as thirty or forty liters, with subsequent determination of the melting point of the crystals.

A discussion will then follow of the total coproporphyrin excretion in the 24-hour urine and the isomer distribution in various diseases under normal and pathological conditions, including: (1) hepatitis and

*(Continued on Page 94)*

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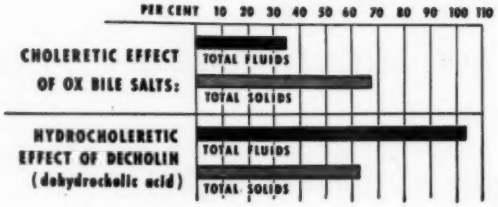
PER CENT 10 20 30 40 50 60 70 80 90 100 110
CHOLERETIC EFFECT OF OX BILE SALTS:
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TOTAL SOLIDS
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TOTAL SOLIDS

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Ivy, A. C., et al: Am. J. Dig. Dis. 7:333 (Aug.) 1940.

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*(Continued from Page 92)*

cirrhosis; (2) alcoholism; (3) anemias and blood dyscrasias; (4) affections of the nervous system with particular reference to poliomyelitis and other neurotropic virus diseases; and (5) idiopathic coproporphyrinuria with abdominal pain.

It will be emphasized that porphyria in which uroporphyrin is formed and excreted is an independent disease in which there is an inborn error of metabolism. Porphyria is thus to be sharply differentiated from the symptomatic coproporphyrinurias of various types as alluded to above. Two main forms of porphyria will be discussed briefly; namely, the intermittent acute form, and the congenital or light-sensitive form. While the latter is undoubtedly very rare, the former occurs much more frequently than has been realized. Its confusion with various other disease states will be mentioned. The clinical and laboratory manifestations in porphyria will be alluded to.

### Discussion

DR. E. L. ALTHAUSEN, University of California Hospital, San Francisco (by invitation): I certainly cannot add anything constructive to this presentation. However, I was also very much interested in hearing this paper and can say that a very valuable field of investigation has been opened and a great deal of work has gone into the presentation given here tonight. I shall inquire into the possibility of starting something similar when I get home.

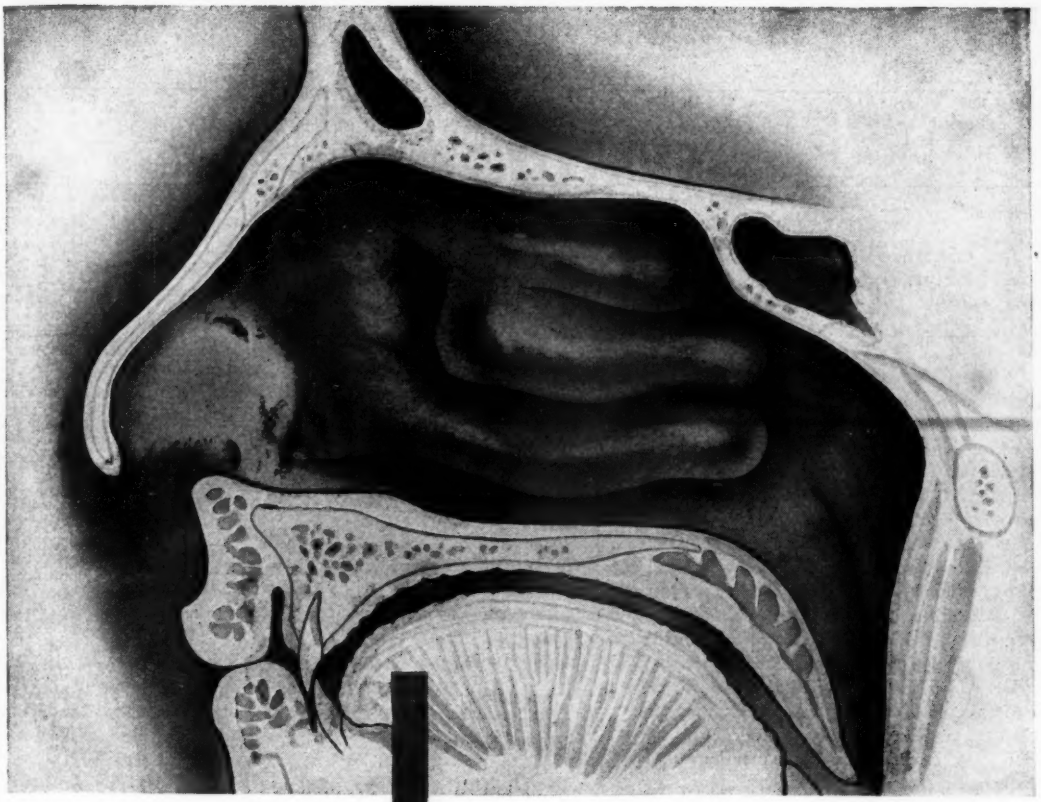
DR. E. SHORR, Cornell University, New York City (by invitation): I am very much in Dr. Althausen's position of not having had direct experience with porphyrin metabolism. I came to Minneapolis with the idea of interesting people in various types of liver diseases and shall return to New York with greater interest in proporphyrins. I leave Minneapolis with regret. Like Dr. Althausen, I shall attempt to learn Dr. Watson's technique and feel sure it is going to add zest to our liver problem studies.

DR. S. E. SWEITZER, Minneapolis: Dr. Watson mentioned insecticides. Did he find any sensitivity to the use of DDT powder in delousing? We use it quite a lot at the Minneapolis General Hospital, and so far have not seen any cases of sensitivity.

DR. WATSON, in closing: I am very grateful to those who were so kind as to discuss my contribution. In regard to insecticides, I don't know what to say about DDT but I have no evidence that it causes anemia. I think insecticide injury is a matter of sensitivity. I remember very well a case as remarkable as any I have ever seen. A young man from North Dakota first came to the University Hospital in 1928. He was found to have aplastic anemia. The history states that he had been working in a grocery store with insecticide powders. He was transfused a number of times and allowed to go home. He went back to North Dakota where for two or three years he did not return to his former kind of work. Then he did return to it, handling insecticide powders again, after which he had a very severe relapse of his aplastic anemia. We followed him for six years, giving many transfusions. He died of a gas bacillus sepsis. Perhaps if he had avoided the insecticide powder, he might have been able to recover completely.

The meeting adjourned.

A. E. CARDLE, M.D., *Secretary*



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# In Memoriam

### JOHN FREDOLPH ALDEN

Dr. John Alden was born in Sweden on January 8, 1888. The names of his parents are not known. He left Sweden at the age of fifteen, came to the United States and settled in southern Minnesota where he went to school.

After finishing high school, he attended Gustavus Adolphus College in St. Peter, and later attended Loyola University in Chicago. In 1916 he graduated from the medical department of Marquette University, Milwaukee, Wisconsin. His internship was served at St. Joseph's Hospital, Saint Paul, in 1916 and 1917, and he entered general practice in 1917.

In 1921 Dr. Alden married Zena Furberg. They had three children—Dr. John Fredolph, Jr., Virginia May and Robert William.

He was a member of the Alpha Kappa Kappa Medical Fraternity, the Saint Paul Athletic Club and the Automobile Club.

Dr. Alden was active in the Osman Temple, the Inter-Professional Men's Institute, the Ramsey County Medical Society, and the American College of Physicians and Surgeons. He was a staff member of Bethesda, St. Joseph's and Children's Hospitals.

On August 10, 1947, at Lake Owasso, while swimming from the shore to a sail boat moored near by, death came by drowning.

Dr. Alden represented a fine type of general practitioner which is becoming altogether too rare. He will be missed by his many friends both in and out of the profession.

He was a member of Gloria Dei Lutheran Church. Interment was at Acacia Park Cemetery.

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### GEORGE ALFRED MORLEY

Dr. G. A. Morley of Crookston passed away November 19, 1947, following a heart attack. He was seventy-nine years of age.

Dr. Morley was born March 15, 1868, in Juneau County, Wisconsin. He received his M.D. degree at Rush Medical College in 1897. He specialized in eye, ear, nose and throat diseases, which he had practiced for many years.

Dr. Morley was a former president of the Crookston public school system. He was a member of the Red River Valley Medical Society, the Minnesota State and American Medical Associations.

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### PETER ERNEST KIERLAND

Dr. P. E. Kierland, a practitioner of Alexandria, Minnesota, for the past four years, died in Chicago on November 29, 1947, en route to Florida.

Dr. Kierland was born at Rushford, Minnesota, May 18, 1878. He attended the University of Minnesota graduating from Rush Medical College in 1902. He practiced at Aberdeen, Washington, from 1902 to 1904, at Mahnomen, Minnesota, from 1904 to 1912, at Harmony, Minnesota, from 1912 to 1922, and at Alexandria from 1922 until his death.

He was a member of the Park Region District and County Medical Society, the Minnesota State and American Medical Associations.

Dr. Kierland married Elsie M. Ochsner of Henning, Minnesota, July 21, 1905. He is survived by his widow and three children, Dr. Robert Kierland of Rochester, and two daughters.

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### SAMUEL ROBINSON

Dr. Samuel Robinson died on September 17, 1947, at Santa Barbara, California.

Samuel Robinson was born February 23, 1877, at Augusta, Maine. He received the degree of B.A. in 1898 and of M.D. in 1902 from Harvard University; was an intern at the Massachusetts General Hospital, Boston, from 1901 to 1903. From 1903 to 1912 he practiced at Boston and from 1912 to 1915 at Clifton Springs, New York.

He entered the Mayo Clinic, Rochester, Minnesota, as head of the Section on Thoracic Surgery in January, 1915. He was first assistant in general surgery from 1915 to 1916; also, he was assistant professor of surgery, The Mayo Foundation, from 1915 to 1917. He left the Mayo Clinic, October 26, 1917.

During World War I, Dr. Robinson was chief of the surgical service, with the rank of major, at the Letterman General Hospital, Presidio, San Francisco. In 1918 he went to Santa Barbara to practice surgery. He was chief of the surgical staff of the Santa Barbara General Hospital and was a member of the surgical staff of the Santa Barbara Cottage Hospital and of the St. Francis Hospital.

Dr. Robinson was a fellow of the American College of Surgeons and a member of the American Medical Association, the American Association for Thoracic Surgery, the Interurban Surgical Society and the Pacific Coast Surgical Association.

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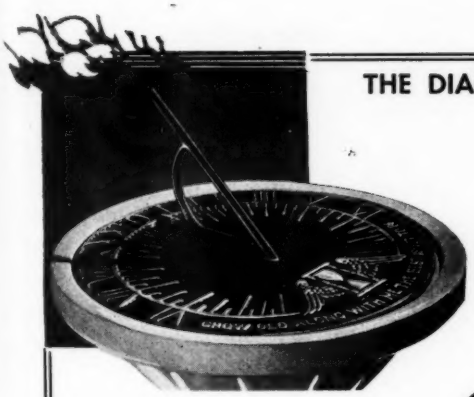
### JOSEPH MOSES

Dr. Joseph Moses, a prominent physician of Northfield, Minnesota, died November 18, 1947, at the age of sixty.

Dr. Moses was born November 17, 1887, at Herman, Minnesota. His family came to Northfield in 1894. After attending Carleton College, he attended the University of Minnesota Medical School where he graduated in 1914. After serving an internship at Minneapolis

*(Continued on Page 98)*



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*(Continued from Page 96)*

General Hospital, he practiced at Adams, Minnesota, and then enlisted as a lieutenant in the Army Medical Corps, being stationed at Fort Riley, and Camp Pike, Arkansas. Upon his discharge with the rank of Captain, he located at Northfield becoming associated with the late Dr. Warren Wilson.

Dr. Moses was a member of the Rice County Medical Society of which he was one time president, the Minnesota State and American Medical Associations. He was also chairman of the Rice County Public Health Association and during World War II served as medical examiner for war services. He was a charter member of the Northfield Lions Club, serving as president, of the Masonic Blue lodge, the Odd Fellows, the Workmen and the American Legion. Other activities included participation in the organization of the Community Chest, membership on the Board of Education, and serving as vice president of the Northfield National Bank.

A lifelong Democrat, Dr. Moses served for several years as a member of the Democratic State Central Committee and, in 1936, was one of the Minnesota delegates who went to Philadelphia to renominate President Roosevelt for his second term.

On June 8, 1915, Dr. Moses married Edith Elizabeth Street of Northfield, who with a brother, Roy, of Northfield, three nephews and a niece survive him.

**JOHN STEVENS**

Dr. John Stevens, a practitioner at Gonvick, Minnesota, for thirty-five years, died at his home, December 1, 1947, at the age of seventy-two.

Dr. Stevens was born at Rockland, Maine, November 26, 1876. He graduated from the University of Minnesota Medical School in 1897, and practiced at Belfast, Maine, from 1898 until 1911. Returning to Minnesota in 1911, he located temporarily at Bagley, but in 1912 moved to Gonvick. In 1921, he took postgraduate work at the Postgraduate Hospital in Chicago.

Dr. Stevens served as village health officer and for a number of years headed the Board of Education of Gonvick. During World War I, he served as a medical officer with the 88th Division overseas.

Dr. Stevens married Bessie Marden in the East before coming to Minnesota. He lost her in the influenza epidemic of 1918-19. Later he married Mabel Newman. He is survived by his widow and a son, John, Jr., and also by a son by his former marriage.

He was a member of the Red River Valley Medical Society, the Minnesota State and American Medical Associations.

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# Reports and Announcements

### ARMY ORGANIZED RESERVE

A meeting of the 110th General Hospital of the Army Organized Reserve was held January 20, 1948, at 8:00 p. m. at Fort Snelling, Minnesota. Speaker of the evening was Lt. Col. Stanford Johnson, Director of Medical Administration, Branch 8 Veterans Administration, Minneapolis. Colonel Johnson gave a résumé of the conference which he attended December 15-19, 1947, at 5th Army headquarters in Chicago.

### POSTGRADUATE COURSE IN DISEASES OF THE CHEST

The American College of Chest Physicians, Pennsylvania Chapter, and the Laennec Society of Philadelphia are sponsoring a postgraduate course in diseases of the chest to be held during the week of March 15-20, 1948, at the Warwick Hotel, Philadelphia, Pennsylvania.

The emphasis in this course will be placed on the newer developments in all aspects of diagnosis and treatment of diseases of the chest.

The course will be limited to thirty physicians. Tuition fee is $50 for members, and $90 for non-members.

Further information may be secured at the office of the American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

### NATIONAL CONFERENCE ON MEDICAL SERVICE

Chicago again plays host to the National Conference on Medical Service on February 8. Because the program features wide-open discussions of important controversial problems affecting medical practice, hospitals and nursing, the Conference promises to be of outstanding interest to general practitioner and specialist alike, according to Dr. F. F. Sladek, Traverse City, Michigan, secretary of the Conference.

President of the Conference, Dr. Creighton Barker, New Haven, Connecticut, will open the 1948 session in the Red Lacquer Room of the Palmer House at 9:30 a. m. The morning program will develop two viewpoints on the subject "The Practice of Medicine by Hospitals, Health Departments and Medical Schools" through papers presented by Everett W. Jones, general manager of the Modern Hospital, Chicago, and Dr. Lowell S. Goin, of Los Angeles. Dr. L. Fernald Foster, Bay City, Michigan, will speak on the subject, "Medical Public Relations Begin in the Doctor's Office." "Nursing Problems in America" will be reviewed by Dr. Thomas P. Murdock, of Meriden, Connecticut, and Janet Geister of Chicago.

The afternoon has been given over to panel presentations on the subjects, "General Practice and "Specialty Boards," participated in by Dr. Wingate M. Johnson, Winston-Salem, North Carolina; Dr. C. F. Wilkinson, Ann Arbor, Michigan; Dr. Leroy E. Parkins, Boston; Dr. Paul Titus, Pittsburgh, and Dr. C. N. H. Long, New Haven, Connecticut. This will be followed by discussion with general audience participation.

### MISSISSIPPI VALLEY MEDICAL SOCIETY

The thirteenth annual meeting of the Mississippi Valley Medical Society will be held at Springfield, Illinois, on September 29 and 30 and October 1, 1948, under the presidency of Dr. W. O. Thompson, professor of medicine at the University of Illinois. The society now has a membership of nearly 1,000.

### MIDWEST RADIOLOGIC CONFERENCE

The 1948 Midwest Radiologic Conference will be held at the Hotel Schroeder, Milwaukee, February 6 and 7, and will be followed by the annual conference of teachers of radiology in Chicago on February 8. Principal speaker at a dinner to be held on the evening of February 6 will be Dr. Robert R. Newell, professor of radiology, Stanford University School of Medicine, San Francisco.

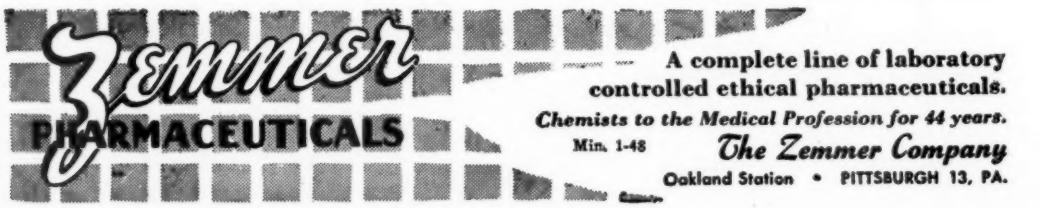
Inquiries concerning details of the meeting may be sent to Dr. A. Melamed, Secretary, Milwaukee Roentgen Ray Society, 425 East Wisconsin Avenue, Milwaukee 2, Wisconsin.

### NICOLLET-LE SUEUR COUNTIES SOCIETY

At the annual meeting of the Nicollet-LeSueur Counties Medical Society in St. Peter on December 3, Dr. L. E. Sjostrom, St. Peter, was elected president to succeed Dr. Hobart Johnson, North Mankato.

Other officers elected at the meeting were Dr. Martin Henry, St. Peter, vice president, and Dr. Alfred Sherman, St. Peter, secretary-treasurer. Dr. E. G. Olman-

*(Continued on Page 102)*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*(Continued from Page 100)*

son, St. Peter, was named as delegate to the state association meeting, with Dr. C. S. Strathern, St. Peter, as alternate.

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**GOODHUE COUNTY SOCIETY**

Election of officers for the coming year was held at the annual dinner meeting of the Goodhue County Medical Society in Red Wing on December 4.

Dr. M. B. Flom, Cannon Falls, was named president of the society, while Dr. W. M. Akins, Red Wing, became vice president, and Dr. J. F. Brusegard, Red Wing, secretary-treasurer. Dr. R. F. Hedin, Red Wing, was named delegate to the state association meeting, with Dr. H. T. McGuigan, Red Wing, as alternate.

---

**RAMSEY COUNTY SOCIETY**

Newly elected officers of the Ramsey County Medical Society are Dr. J. R. Aurelius, president-elect; Dr. J. N. Gehlen, vice president, and Dr. Laurence D. Hilger, secretary-treasurer.

New president of the society is Dr. C. K. Williams, who was named president-elect one year ago and who succeeds Dr. John M. Culligan, retiring president.

**ST. LOUIS COUNTY SOCIETY**

Iron Range and Duluth practitioners gathered on December 11 at the Northland Country Club for the annual meeting and banquet of the St. Louis County Medical Society.

Principal speaker at the meeting was Harry C. Applequist, Duluth attorney, who delivered an address entitled "Lethargy in Our Social Order."

With election of officers, Dr. P. S. Rudie, Duluth, former president-elect, became president of the society, succeeding Dr. D. W. Wheeler, Duluth. Other officers elected at the meeting were Dr. Mark Tibbetts, Duluth, president-elect; Dr. J. P. Grahek, Ely, vice president, and Dr. Karl E. Johnson, Duluth, secretary.

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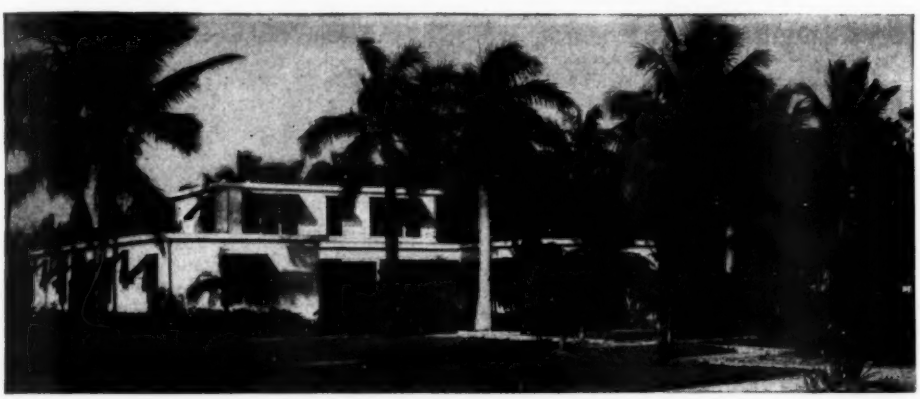
**SOUTHWESTERN MINNESOTA MEDICAL ASSOCIATION**

In spite of adverse weather, more than fifty persons attended a meeting of the Southwestern Medical Association in Worthington on November 17.

Association members joined with auxiliary members for an evening smorgasbord dinner. After dinner, the two groups separated to conduct their respective programs. Association members heard Dr. John Moe, Minneapolis, speak on "Back Pain," illustrating his talk with motion pictures and slides. Members of the auxiliary heard an address on public relations by Mrs. Harold Wahlquist, national auxiliary public relations chairman.

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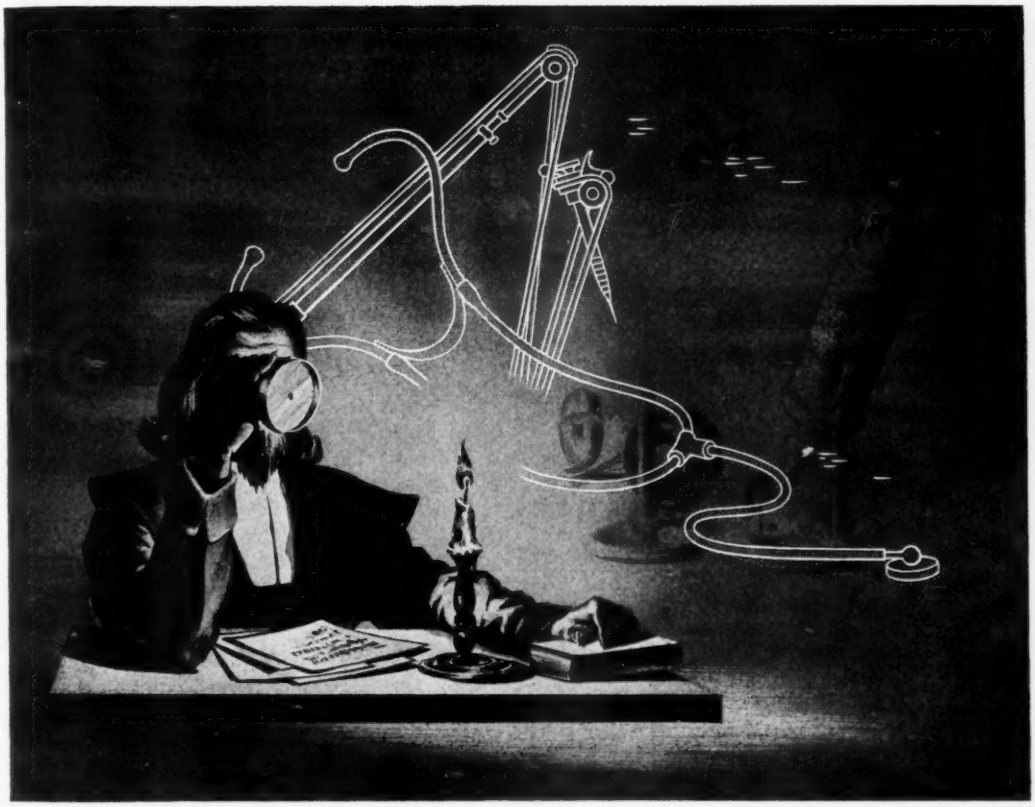

# The First Microscope...

***For Both Medicine and Dentistry,*** the playful hobby of a Dutch spectacle-maker was of incomparable importance. "Spectacle-maker," *indeed!* What more weird "spectacle" than a tiny flea, lumbering huge, hairy and horrible through the lenses of Hans Janssen, about 1590?

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But a doctor's legal liability was growing as fast as his knowledge. Sir Edward Coke, "father of the common law," ruled in 1615 that a doctor could be sued not only by a patient's employer for breach of contract, but also by the employee for malpractice.

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# Of General Interest

In Royalton on December 2, municipal election results showed that Dr. A. M. Watson had been re-elected village president.

* * *

Dr. Frank S. Babb has opened offices at 625 Lowry Medical Arts Building, Saint Paul, for the practice of orthopedic surgery.

* * *

Dr. Dwight L. Martin has opened an office at 653 Lowry Medical Arts Building, Saint Paul, where he is limiting his practice to internal medicine.

* * *

On December 1, Dr. H. J. Setzer, Saint Paul, moved his office to a newly constructed clinical building at 1604 Randolph Avenue. Space in the one-story structure is shared by Dr. Setzer and a dentist, Dr. E. E. Petersen.

* * *

One of nine new directors recently elected to serve on the board of the Minnesota Public Health Association is Dr. Hans Johnson, Kerkhoven, who will serve for a term of three years.

* * *

Among the Minnesota physicians attending the convention of the American College of Physicians, held in Milwaukee, Wisconsin, on November 14 and 15, was Dr. R. V. Sherman of Red Wing.

* * *

Psychology in everyday living was discussed on December 8 by Dr. Maurice N. Walsh, Rochester, in a lecture in Owatonna sponsored by the Board of Library Trustees of that city.


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An additional office has been opened by Dr. James W. Reid, Saint Paul. He now maintains offices at 405 Fifteenth Avenue North, South Saint Paul, and at 458 South Robert Street, Saint Paul.

* * *

Announcement has been made by Dr. Walter R. Carley that his office is now located at 1457 Lowry Medical Arts Building, Saint Paul, with his practice limited to psychiatry.

* * *

Dr. William J. Hultgen has returned from military service and has opened an office at 939 Lowry Medical Arts Building, Saint Paul, with practice limited to eye, ear, nose and throat diseases.

* * *

"If I Had Asthma" was the title of an address given by Dr. L. E. Prickman, Rochester, at a meeting of the Des Moines County Medical Society in Burlington, Iowa, on December 9.

* * *

After recently completing a fellowship in neurology at the Mayo Clinic, Dr. E. M. Hammes, Jr., has become associated in practice with his father, Dr. Ernest M. Hammes, with offices in the Lowry Medical Arts Building, Saint Paul.

* * *

"Diagnostic Procedures in Vascular Diseases of the Extremities" was the subject of an address by Dr. W. F. Kvale, Rochester, at a meeting of the American Academy of Dermatology and Syphilology in Chicago early in December.

* * *

Announcement has been made that Dr. Henry W. Woltmann of Rochester was elected president of the Association for Research in Nervous and Mental Disease at the organization's annual meeting in New York in December.

* * *

Dr. H. L. Williams, Rochester, presented a paper on "Diagnosis and Treatment of Chronic Suppurative Disease of the Paranasal Sinuses" at a meeting of the Chicago Laryngological and Otological Society in Chicago on December 1.

* * *

Members of the Fifth District Minnesota Federation of Women's Clubs heard Dr. Sumer S. Cohen, assistant medical director of Glen Lake Sanatorium, discuss the


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Christmas Seal streptomycin fund at a meeting held in Minneapolis on November 29.

* * *

"Factors Influencing Survival and Death in Coronary Artery Disease" was the title of a paper presented by Dr. F. A. Willius, Rochester, at a meeting of the regional division of the American College of Physicians in Galveston, Texas, during the first week of December.

* * *

Forty-one children, ten of them Indians from the Red Lake Reservation were examined at a crippled children's clinic conducted in Beltrami County during the last half of November. The clinic was held in Bemidji and in several other communities in the county.

* * *

On December 13, Dr. Paul F. Dwan, Minneapolis, president of the newly organized Minnesota Heart Association, announced that the organization had been officially recognized as an affiliate of the American Heart Association.

* * *

Dr. Charles D. Freeman, Saint Paul, has announced his retirement from practice. His dermatology practice will be continued by his son, Dr. Charles D. Freeman, Jr., with offices at 1160 Lowry Medical Arts Building, Saint Paul.

* * *

Dr. Roy T. Pearson, Shakopee, was appointed medical director of Mudcura Sanitarium following the death on October 14 of Dr. Henry E. Wunder, director of the sanitarium for twenty years. Dr. Pearson's brother, Dr. B. F. Pearson, is associated with him on the staff.

* * *

The Order of Yun Hui (Beautiful Cloud) has been awarded Dr. J. H. Grindlay, Rochester, by direction of Chiang Chung-Cheng, president of the national government of the Republic of China. The decoration was conferred for meritorious services carried out during the war in the Orient.

* * *

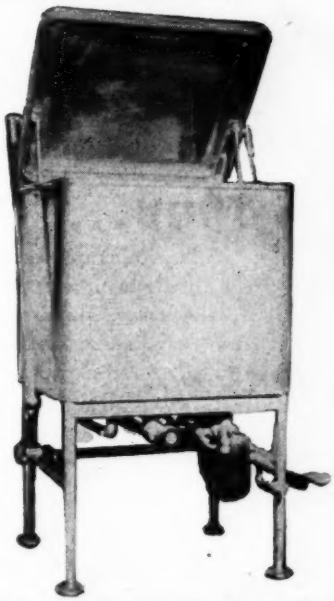
Members of the Western Surgical Association, meeting on December 4 at Colorado Springs, heard Dr. H. W. Meyerding of Rochester present a paper entitled "Comments on the Differential Diagnosis and Treatment of Painful Stiff Shoulder." With his paper, Dr. Meyerding showed a motion picture on the same subject.

* * *

When a postgraduate course on physical medicine was held at New York Polyclinic Hospital in New York during the first week of December, Dr. W. B. Martin of Rochester presented two papers entitled "Microwaves (Radar) as a Source of Therapeutic Heat" and "The Medical Applications of Atomic Energy."

* * *

At the annual meeting of the Hennepin County chapter of the American College of Physicians and Surgeons, held in Minneapolis in November, Dr. Willis M. Duryea and Dr. John H. Higgins, of Minneapolis, were elected president and vice president, respectively, while Dr. James A. Blake, Hopkins, was elected secretary-treasurer.

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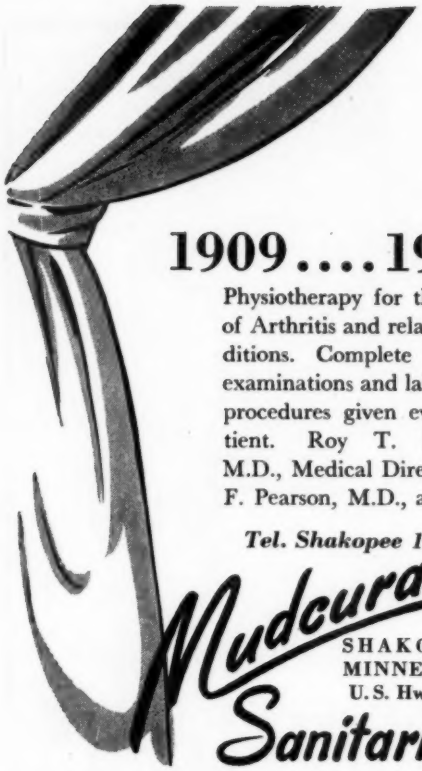

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Formerly of California, Dr. Walter H. Sutherland purchased the building and practice of Dr. C. L. Scofield, Benson, and began practice in Benson on December 1. After graduating from the College of Medical Evangelists, Los Angeles, California, in 1944, Dr. Sutherland served in the army until April, 1947.

* * *

In November, Dr. J. K. Butler of Carlton announced the opening of offices in Cloquet for the practice of Medicine and surgery. The offices are in the Trico Building at 12th and Cloquet Avenue, with office hours from 9:00 a.m. to 5:00 p.m. weekdays and 9:00 a.m. to 12:00 noon on Saturdays.

* * *

Formerly of Spring Grove, Dr. Orville M. Rotnem has moved to Mabel and opened offices for the practice of medicine. A graduate of the University of Minnesota Medical School, Dr. Rotnem practiced at Spring Grove after his release from the armed forces in May, 1947.

* * *

On behalf of the national Fraternal Order of Eagles, the Rochester chapter on November 18 presented Dr. Charles W. Mayo with a bronze plaque for distinguished service to the nation, "in recognition of contributions to the welfare of our country and active participation in civic affairs." Dr. Mayo is the fourth person to be so honored by the fraternal organization.

* * *

Principal speaker at the first annual meeting of the Faribault County Public Health Nursing Service, held in Blue Earth on November 20, was Dr. Robert N. Barr, chief of the section of administration in the Minnesota Department of Health. The meeting was held in conjunction with a meeting of the Blue Earth Parent-Teachers Association.

* * *

In recognition of his work in directing the Steele County x-ray survey, the Trudeau Medical Society at a meeting in November elected Dr. J. F. Shaefer, Owatonna, to membership in the group. In addition to directing the county-wide x-ray survey, Dr. Shaefer has been a member of the board of the Cannon Falls tuberculosis state sanatorium since 1946.

* * *

"Does Allergy Interfere with the Child's Development?" was the topic discussed by Dr. Albert V. Stoesser at a meeting of Section I of the Child Psychology Study Circle in Minneapolis on December 1. Dr. Stoesser is clinical professor of pediatrics at the University of Minnesota Medical School and director of the allergy clinics at the University and at Minneapolis General Hospital.

* * *

A senior physician at the Fergus Falls State Hospital since June, 1941, Dr. Werner Hemstead has resigned his position and has moved to Minneapolis to live with his son.

Fifty-five years of medical practice in Minnesota lie behind Dr. Hemstead, including twenty years as physician at the St. Cloud reformatory.

# FOURTH ANNUAL CLINICAL CONFERENCE

*of the*

## CHICAGO MEDICAL SOCIETY

**Palmer House, Chicago, Illinois**
**March 2, 3, 4, 5, 1948**

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At the start of the New Year, Dr. David Feigel, formerly of the Branton Clinic in Willmar, moved to Graceville and joined the staff of the Dr. I. L. Oliver Clinic. He replaced Dr. Gordon Vaughn, who, after practicing at the Oliver Clinic for four months, left for Minneapolis on December 20 to take postgraduate work at Minneapolis General Hospital.

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The Chicago Medical Society has commenced publication of a weekly bulletin, *This Week in Chicago Medicine,* for the information of physicians who visit Chicago. Copies will be widely distributed throughout the country, are available at certain Chicago hotels, and may be obtained from the headquarters of the Chicago Medical Society, 30 North Michigan Avenue, Chicago.

* * *

Plans and possible projects of the newly organized Mower County Health Council, first of its kind in the state, were described by Dr. Paul C. Leck, Austin, when he spoke to the Lions Club in Austin on December 8. Dr. Leck, as chairman of the Rural Medicine Committee of the Minnesota State Medical Association, is in charge of the county health council project in Minnesota.

* * *

On December 9, a group of physicians from China, Japan, Brazil, Hawaii, Central America and Mexico—most of them taking postgraduate work in public health at the University of Minnesota—visited Lafayette School in Saint Paul to observe the school's nutrition clinic. Under the auspices of the Christmas Seal organization, the clinic discovers nutritional needs of children and then provides hot lunches to meet those needs.

* * *

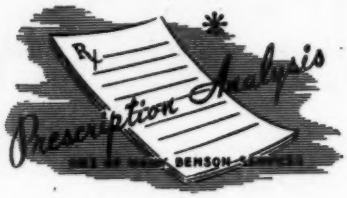
"Emotional Disturbances during Childhood and Their Effect on Adult Maladjustments" was the title of an address presented by Dr. Gordon R. Kamman, Saint Paul, at the annual meeting of the McLeod County Public Health Association in Glencoe on October 28. In Chicago on November 18, Dr. Kamman spoke on "The Value of the Rorschach" at a meeting of the Illinois Association for Applied Psychology.

* * *

Named outstanding practitioner of Goodhue County, Dr. M. R. Williams of Cannon Falls was the candidate of the Goodhue County Medical Society for the honor of being selected outstanding practitioner in Minnesota. Dr. Williams was given the county award in recognition of his work during the past several years, especially during the war years when he carried on as the only physician in Cannon Falls.

* * *

The King Haakon VII liberty medal has been presented to Dr. Ivar Sivertsen, Minneapolis, for services rendered to Norway's cause during World War II. Presentation of the medal was made at a banquet at the Minneapolis Athletic Club on December 12, 1947.

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Dr. Sivertsen examined all members of the Norwegian Air Corps who passed through Minneapolis during the war on the way to Camp Little Norway, Canada. Ten years ago Dr. Sivertsen was presented with the Cross of St. Olaf by the Norwegian government.

* * *

Zumbrota acquired a new physician in December when Dr. C. S. Youngstrom, formerly of La Crosse, Wisconsin, opened offices for the practice of medicine and surgery. A graduate of the Nebraska College of Medicine, Dr. Youngstrom has taken postgraduate work at the University of Wisconsin and at Henry Ford Hospital, Detroit, Michigan. Before moving to Zumbrota, he was associated with the Gunderson Clinic in La Crosse, Wisconsin.

* * *

Recently of Jacksonville, Illinois, Dr. Gladys Trommald has been appointed assistant superintendent of Anoka State Hospital, to serve with Dr. Edmund Miller, superintendent. Not new to Anoka, Dr. Trommald was on the staff of the Anoka State Hospital from 1936 to 1939. Since then she has taken postgraduate work in neurology and psychiatry at the University of Minnesota, has studied at the Wayne County training school in Northville, Michigan, and has been on the staff of the state hospital at Jacksonville, Illinois.

* * *

Guatemala vacations are the solution to winter's problems in the minds of two Minneapolis physicians. Dr. and Mrs. S. Marx White will leave Minneapolis on January 28 for a six-week vacation in Central America, with much of the time being spent in Guatemala. On February 14, Dr. and Mrs. Alfred T. Baker of Minneapolis will sail from New Orleans with a group of friends, planning to vacation for some time in Chichicastenango, an Indian village in the mountains of Guatemala.

* * *

Mental health problems in Minnesota were discussed by Dr. Alexander G. Dumas, assistant clinical professor of psychiatry at the University of Minnesota, at a meeting in Virginia on November 19 of the Virginia Branch of the American Association of University Women. The meeting was open to the public.

As medical director of the Minnesota Mental Hygiene Society, Dr. Dumas described the widespread extent of mental illness, the dearth of facilities and trained personnel for treating mental diseases, and the lack of public knowledge and understanding of mental illnesses.

* * *

At a meeting of the board of directors of Community Health Service, held in Minneapolis in November, Dr. Donald Hastings, head of psychiatry and neurology at the University of Minnesota, stated that top attention should be given to the training of the family physician in psychiatric science. One of his reasons was the fear that not enough psychiatrists would be trained in the next fifty years to meet the demand. The general practitioner, he said, is the "most important cog in the whole machine as far as helping the greatest number of emotionally upset people is concerned."

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**MAY RESEARCH**

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In November, Dr. Ervin Pumala, formerly of Minneapolis, arrived in Warren to become a staff member of the Warren Clinic.

Dr. Pumala, a graduate of the University of Minnesota Medical School in 1940, served in the armed forces during the war, then began medical practice in Minneapolis. His major interest is in x-ray work and diagnosis.

In addition to Dr. Pumala, the staff of the Warren Clinic now includes Dr. C. H. Holmstrom, Dr. M. J. Bechtel and Dr. A. B. Nietfeld.

* * *

During the first week of December, Dr. J. D. Camp and Dr. P. F. H. Pugh, Rochester, were in Boston attending a meeting of the Radiological Society of North America. Dr. Camp presented a paper entitled "Chronic Idiopathic Hypertrophic Osteo-arthropathy," which was written in collaboration with Dr. Robert L. Scanlan, also of Rochester. Dr. Camp also presented an exhibit on "A Grid Front Casette: A Useful Application of the Stationary Grid" and gave two refresher courses entitled "Roentgenography of the Skull" and "Encephalography and Ventriculography." Dr. Pugh presented a refresher course on "The Examination of the Colon."

* * *

Unique in Minnesota was a cancer detection clinic held December 13 in Fergus Falls, with six Duluth physicians serving as department heads.

Housed in a school building, the clinic accommodated 400 residents of Fergus Falls and vicinity who had registered to be examined. Physicians of Fergus Falls assisted the Duluth specialists in conducting the clinic, which was co-sponsored by the Park Region District County Medical Society and the Minnesota Division of the American Cancer Society.

Clinic departmental heads from Duluth were Dr. Charles H. Mead, surgery; Dr. O. B. Patch, eye, ear, nose and throat; Dr. L. L. Merriman, internal medicine; Dr. M. G. Fredricks, dermatology; Dr. Russell J. Moe, gynecology, and Dr. Arthur H. Wells, pathology.

A technicolor motion picture, "The Traitor Within," was shown as part of a cancer lecture given by Dr. Wells, who is chairman of the cancer committee of the Minnesota State Medical Association. The lecture, held in connection with the cancer detection clinic, was open to the public.

* * *

Dedication of the "great hall" of the Mayo Foundation House as "Balfour Hall," in honor of Dr. Donald C. Balfour, director emeritus of the Mayo Foundation, took place at the annual business meeting of the Mayo Clinic staff on November 17. Dr. Balfour was presented with a scroll to commemorate the occasion by Dr. L. M. Randall, who represented the clinic staff.

At a ceremony on December 2, a life-sized oil portrait of Dr. Balfour was presented to the Mayo Foundation by the Association of Fellows of the Mayo Foundation.

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Dr. J. D. Rogers, president of the Fellows association, made the presentation to Dr. Victor Johnson, Foundation director.

* * *

Better training for physicians who plan to become general practitioners was emphasized by Minnesota physicians in their replies to a questionnaire sent out by the University of Minnesota's Department of Postgraduate Medical Education.

Preliminary results of the survey at the end of November also indicated that most physicians feel that one to five years of general practice would be of advantage to physicians before specializing, and that most men now in practice prefer a partnership or group-clinic type of practice. The physician who wanted his own individual practice, without even an assistant, was a rarity.

At the time that these results were announced by Dr. Thomas E. Eyres, who is in charge of the survey, more than one-third of the 2,900 questionnaires sent out had been returned. After completion and tabulation of the survey, which included numerous other queries, a final analysis of the results will be published by Dr. Eyres.

* * *

Appointment of Dr. Francis F. Callahan, Pine City, as chief of the medical services of the State Division of Social Welfare, was announced December 13 by Jarle Leirfallom, director.

Succeeding Dr. Edwin J. Simons, Swanville, who resigned in October, Dr. Callahan is responsible for planning and programming the state crippled children services and the institutional control of tuberculosis in the state, and for the administration of the state sanatorium at Walker. He also acts as medical consultant of county welfare agencies throughout the state.

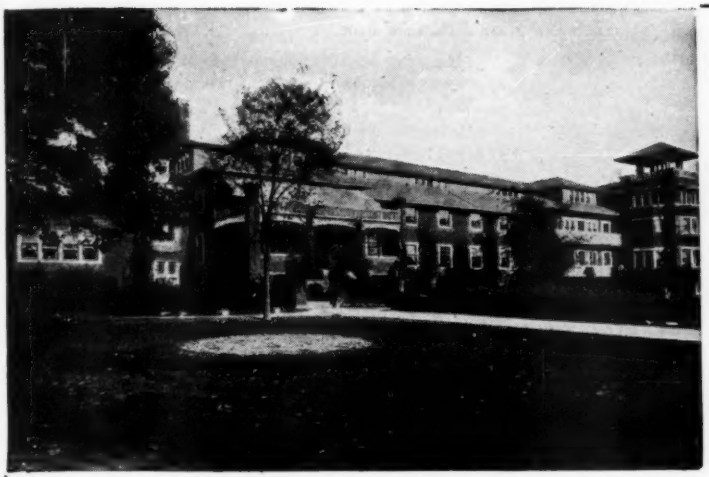
Dr. Callahan, a graduate of the University of Maryland in 1913, has specialized in tuberculosis work since 1916. He was medical director of Pokegama Sanatorium from 1919 to 1942, when he became superintendent of the state sanatorium at Walker. In 1946 he resigned as superintendent to enter private practice in Saint Paul.

* * *

A five-man committee to direct a radio-isotope research program at Minneapolis Veterans Hospital has been appointed by Dr. Harold S. Diehl, chairman of a committee on medical education for the Veterans Administration.

Heading the new committee as chairman is Dr. Wallace Armstrong, chief of the Department of Physiological Chemistry in the University of Minnesota Medical School. The other four members of the committee are Dr. John Tate, University professor of physics; Dr. Samuel Nesbit, Veterans Hospital physician; Dr. Howard Horns, of the University's Department of Medicine, and Dr. Karl Stenstrom, professor of biophysics at the University.

The Veterans Administration has made $25,000 available to establish the program in Minneapolis. Radioisotopes will be obtained from the Atomic Energy Commission.



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After retiring from practice in 1942, Dr. N. O. Pearce, Minneapolis, is again leading an active medical life.

Recently appointed director of the Division of Cancer Control, Minnesota Department of Health, Dr. Pearce has a long history of medical work in Minnesota. After graduating from the University of Minnesota Medical School in 1905, he practiced in Hibbing until 1914, when he accepted a teaching position in pediatrics at the University. In 1918 he returned to private practice in pediatrics and continued in that field in Minneapolis until 1934. He then practiced for eight years in Miami, Florida, finally retiring in 1942. Shortly after that he found himself engaged in supervisory work with the Minnesota Department of Health, upon the invitation of its executive officer, Dr. A. J. Chesley.

Today, under the direction of Dr. Pearce, the Division of Cancer Control is correlating and co-ordinating the work of medical groups concerned with the control of cancer. For Dr. Pearce, retirement is now a thing of the past.

* * *

After twenty years of practice in Elmore, Dr. Arno W. Sommer will close his office and move to Temple, Texas, to become radiologist with the Scott White Clinic.

The Elmore practice is being taken over by Dr. Harry Shragg, formerly of Minneapolis, and Dr. Troy Rollins, formerly of Blue Earth.

Before moving to Elmore in 1927, Dr. Sommer received his medical training at the University of Minnesota, interned at the Northern Pacific Railroad Hospital, and studied at St. Paul and Swedish Hospitals in the Twin Cities. While in Elmore, he was active in many civic organizations and at one time was president of the Elmore Board of Education.

The successors to his practice, Dr. Shragg and Dr. Rollins, studied medicine at the University of Minnesota Medical School. Dr. Rollins is now interning at Minneapolis General Hospital. Dr. Shragg took over the practice in Elmore on January 1; he will be joined by Dr. Rollins in July.

* * *

"After-effects of the atom bomb have been exaggerated," stated Dr. Irving McQuarrie, head of the University of Minnesota's Department of Pediatrics, when he returned December 15 from a three-month study of medical education, research and hospitals in Japan.

"I found cases of persons suffering from scars and anemia," he said, "but their numbers were not as great nor their condition as serious as we had been led to expect."

Since many hospitals and medical centers had been housed in buildings built to withstand earthquakes, they stood up quite well against wartime bombings, Dr. McQuarrie said.

He found that Japan's health is impaired by inadequately trained physicians and by approximately 80,000 "quacks" who practice blood-letting. Many of the

"physicians" were students hurriedly trained as a war-time emergency, who are now being returned to medical schools for another year, to be followed by a period of internship.

Dr. McQuarrie went to Japan for the three-month study at the request of the Rockefeller Foundation.

* * *

According to a recent announcement, the National Cancer Institute of the United States Public Health Service has awarded nearly $750,000 in forty-six grants for clinical and basic biological research.

The Pasteur Institute of Paris and the Hebrew Institute in Palestine are among those receiving grants. For the first time, the National Advisory Cancer Council, composed of outstanding cancer specialists of the country, has made grants to agencies outside the United States.

The University of Minnesota has been awarded three grants: one to Dr. George E. Moore to investigate the use of fluorescein dyes in the detection of malignant tissue; one to Dr. David Glick to make histochemical studies on the stomach in relation to cancer; and one to Dr. Owen H. Wangensteen to attempt to identify a precursor group in gastric cancer.

In addition, twenty-six medical schools have been awarded grants totalling $593,130 for the improvement of cancer teaching, and $132,645 for cancer control projects. An additional grant of $250,000, contingent on the securing of additional funds totalling $650,000, was made to the Roscoe B. Jackson Memorial Laboratory in Bar Harbor, Maine, for replacing the laboratory which was destroyed by fire last fall.

Previously, all state departments of health had been allocated sums totalling $2,500,000 for cancer control projects.

Allotments were made out of the United States Public Health Service funds.

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**HOSPITAL NEWS**

It was announced on November 20 that the Mankato city council had approved the recommendation of Dr. A. F. Kemp, city health officer, to supply oxygen equipment for the Mankato Detention Hospital. It was estimated that the equipment would cost $150 to $200.

* * *

Possible future expansion of the Spring Grove Hospital was provided for in November when the hospital board of directors decided unanimously to purchase an additional lot adjacent to the present hospital grounds. Included among the members of the board of directors is Dr. J. W. Helland, Spring Grove.

* * *

On November 23 it was announced that Miller Hospital in Saint Paul planned to start the Charles T. Miller School of Practical Nursing. Dr. Peter Ward, administrative director of the hospital, in making the announcement, stated that the school would offer a one-year course in various aspects of nursing and would be

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open to young women between the ages of eighteen and thirty-five years.

According to Thelma Dodds, superintendent of nurses, about twenty-five persons were expected to be enrolled in the first class.

* * *

The need for a community hospital in Stewartville, Olmsted County, was reviewed by Dr. William F. Braasch, Rochester, early in November at a meeting of the Stewartville Community Club.

Pointing out that the nearest hospital was forty miles away in Rochester, Dr. Braasch stated, "It is astounding that there has never been a community hospital here before. The need is so great that steps should be taken at once. . . . Construction should begin next spring—and no later."

He stated that only 20 per cent of illnesses required highly specialized care and that a community hospital would better serve the moderate income group, the old age group and the laborer who may have a minor injury or illness.

* * *

Directors of the International Falls Memorial Hospital have announced the appointment of Marie E. Jarshaw as superintendent of the hospital, which is now being equipped for service. Miss Jarshaw, a graduate nurse of the Deaconness Hospital in Grand Forks, North Dakota, has been administrator of St. Luke's Hospital in Thief River Falls for the past four years.


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Surgical Anatomy and Clinical Surgery, two weeks, starting February 16, March 15.
Surgery of Colon and Rectum, one week, starting March 8, April 26.
Surgical Pathology, every two weeks.
FRACTURES AND TRAUMATIC SURGERY—Intensive course, two weeks, starting April 26.
GYNECOLOGY—Intensive course, two weeks, starting February 23, March 29.
Personal course in Vaginal Surgery, starting February 16, March 22.
OBSTETRICS—Intensive course, two weeks, starting March 15, April 12.
MEDICINE—Intensive course, two weeks, starting April 26.
Personal course in Gastroscopy, two weeks, starting March 29, April 19.
Electrocardiography and Heart Disease, four weeks, starting February 16, May 3.
CYSTOSCOPY—Ten-day course, starting January 5, January 19, February 2.
DERMATOLOGY—Formal course, two weeks, starting April 26.
Clinical course, every two weeks.

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## BOOK REVIEWS

**Books listed here become the property of the Ramsey, Hennepin and St. Louis County Medical Libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.**

HANDBOOK OF FRACTURES. Duncan Eve, Jr., M.D., F.A.C.S. Surgeon-in-Chief Nashville, Chattanooga and St. Louis Railroad; District Surgeon, Louisville and Nashville Railroad; Associate Professor of Surgery, Vanderbilt University School of Medicine, etc. 263 pages. Illus. Price $5.00, cloth. St. Louis: C. V. Mosby Co., 1947.

400 YEARS OF A DOCTOR'S LIFE. Collected and arranged by George Rosen, M.D., and Beate Caspari-Rosen, M.D. 429 pages. Price, $5.00, cloth. New York: Henry Schuman, Publisher, 1947.

DIABETES MELLITUS in General Practice. Arthur R. Colwell, M.D. Associate Professor of Medicine and Director of Medical Specialty Training, Northwestern University Medical School; Attending Physician Evanston Hospital, Evanston; Consulting Physician, Wesley Memorial Hospital, Chicago. 350 pages. Illus. Price $5.25, cloth. Chicago: Year Book Publishers, 1947.

EMOTIONAL MATURITY. The development and dynamics of personality. Leon J. Saul, M.A., M.D. Associate Professor of Psychiatry, Temple University School of Medicine; Special lecturer in Psychiatric Information, Bryn Mawr College. 338 pages. Illus. Price $5.00, cloth. Philadelphia: J. B. Lippincott Co., 1947.

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SEXUAL BEHAVIOR IN THE HUMAN MALE. Alfred C. Kinsey, Professor of Zoology, Indiana University, Wardell B. Pomeroy, Research Associate, Indiana University, and Clyde E. Martin, Research Associate, Indiana University. 804 pages. Illus. Price $6.50, cloth. Philadelphia: W. B. Saunders Co., 1948.

SYNOPSIS OF NEUROPSYCHIATRY. Second Edition. Lowell S. Selling, M.D., Ph.D., Dr.P.H., F.A.C.P. Director of Division of Mental Health, Florida Department of Health; Formerly Attending Neuropsychiatrist, Deaconess Hospital; Associate Attending Neuropsychiatrist, Mt. Carmel Mercy Hospital and Wayne County General Hospital; Director Psychopathic Clinic, Recorder's Court, Detroit; Assistant Professor of Criminology, Medical Jurisprudence and Social Hygiene, University of Illinois College of Medicine; Lecturer in Psychology, Wayne University; Visiting Professor of Psychology, Iowa State College. 561 pages. Illus. Price, $6.50, cloth. St. Louis: C. V. Mosby Co., 1947.

UNIPOLAR LEAD ELECTROCARDIOGRAPHY. Including Standard Leads. Unipolar Extremity Leads and Multiple Unipolar Precordial Leads. Emanuel Goldberger, B.S., M.D. Adjunct Physician, Montfiore Hospital, New York; Cardiographer and Associate Physician, Lincoln Hospital, New York; Diplomate of the American Board of Internal Medicine; Clinical Lecturer in Medicine, Columbia University Faculty of Medicine. 182 pages. Illus. Price, $4.00, cloth. Philadelphia: Lea & Febiger, 1947.

THE FOOT AND ANKLE. Third Edition. Injuries, Diseases, Deformities and Disabilities. Philip Lewis, M.D., F.A.C.S. Professor of Bone and Joint Surgery and Acting Head of Department, Northwestern University Medical School; Professor of Orthopedic Surgery, Postgraduate Medical School, Cook County Hospital. 847 pages. Illus. Price, $11.00, cloth. Philadelphia: Lea & Febiger, 1947.

DISEASES OF THE NOSE, THROAT AND EAR. Ninth Edition. William Lincoln Ballenger, M.D., F.A.C.S. Late Professor, School of Medicine, University of Illinois; and Howard Charles Ballenger, M.D., F.A.C.S., Associate Professor and Acting Chairman of the Department of Otolaryngology, Northwestern University School of Medicine, Chicago. Assisted by John Jacob Ballenger, B.S., M.D., Research Fellow in Otolaryngology, Northwestern University School of Medicine, Chicago. 993 pages. Illus. Price, $12.50, cloth. Philadelphia: Lea & Febiger, 1947.

A PRIMER OF CARDIOLOGY. George E. Burch, M.D., F.A.C.P. Associate Professor of Medicine, Tulane University School of Medicine; Senior Visiting Physician, Charity Hospital; Consultant in Cardiovascular Diseases, Ochsner Clinic; and Paul Reaser, M.D., Instructor in Medicine, Tulane University School of Medicine; Assistant Visiting Physician, Charity Hospital, New Orleans. 272 pages. Illus. Price, $4.50, cloth. Philadelphia: Lea & Febiger, 1947.

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PRACTICAL X-RAY TREATMENT. Arthur W. Erskine, M.D. Chief radiologist, St. Luke's Methodist Hospital and Mercy Hospital, Cedar Rapids, Iowa; past Chairman of Section on Radiology of the AMA. Third edition. 156 pages. Illus. Price, $4.50, cloth. Saint Paul and Minneapolis: Bruce Publishing Company, 1947.

The author has once more revised and brought up to date his excellent book on x-ray treatment, partly in the light of continuing developments in the art but particularly in the light of his own large experience in an active radiation-therapy practice. The new edition, as was the

case with the previous two editions, shows how one successful radiation therapist uses roentgen therapy and, to some extent also, radium therapy. Dr. Erskine shows how better results can be realized from the equipment at one's disposal by attention to a proper power supply, to safety measures, and to accuracy in calibration, both as to quality and quantity. He stresses intelligence and skill in the planning of treatment for the particular case, with especially careful use of the now readily available and reliable depth distribution data, an adequate range of which is included in the book—either assembled for easy reference from other sources, or, where necessary, modified without loss of validity to suit his own particular requirements.

The author feels that there should be as much standardization and simplification as possible of the various voltages, filtrations, target-field distances, et cetera, that are employed, and he confines himself to practically only two voltages, 135 and 200 kvp. Of course, in view of the necessary use of several different filtrations and target-skin distances for each voltage, a considerable number of intensity and distribution tables are therefore still necessary.

Attention is called to the probable fact that there is no difference in the biological effect of different wavelengths, provided the same actual dose is absorbed, and that the only need for different penetrations, therefore, is the ability to get the radiation to where it is needed, with the least possible effect superficial to the area which one desires to treat. Though he does not use supervoltage equipment, the author rightly believes that the only reason for using very high voltages would be the high percentage depth doses obtained, but that this type of therapy is uneconomical because of the higher cost involved.

In the chapter on skin diseases the treatment of the various hemangiomata and vascular nevi is more elaborated than in the previous edition. Since the advent of shockproof tubes, x-ray treatment is preferred to radium for treatment of the vascular nevi. However, care must be used in the treatment of vascular tumors near epiphyses of infants, to avoid interference with growth.

Skin cancer is now included in the chapter on malignant tumors—a more logical arrangement.

Infections, such as erysipelas, palmar abscess, felon, postoperative parotitis, sinusitis, virus pneumonia, gas bacillus infection, arthritis of some types, which are effectively treated by irradiation are discussed in a separate chapter.

Other nonmalignant conditions, such as hyperthyroidism, tuberculous lymph nodes, uterine hemorrhage and fibroid tumors, are covered quite adequately for the size of the volume.

The relation of the radiologist to the cancer problem is treated in a separate chapter and is discussed more fully than in the previous editions.

Cancer of the various organs is, in some cases, discussed more extensively, especially transvaginal x-ray treatment of cancer of the cervix, which the author prefers to radium whenever it can be efficiently applied, as the uniformity and adequacy of deep dosage exceed that of the best radium technique.

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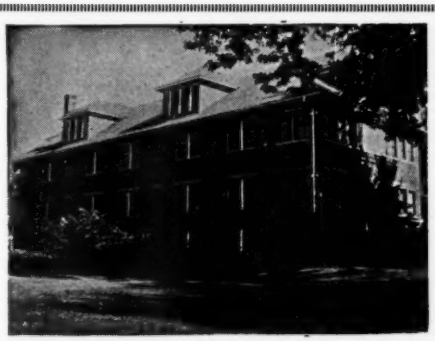

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In cancer of the breast, Dr. Erskine believes that operable cases should be treated surgically. He advocates preoperative irradiation, provided that shrinkage, and perhaps disappearance, of the tumor does not lead to abandonment of surgery. Postoperative therapy can increase the five-year surgical survivals about 10 per cent when the involvement is limited to the breast, and about 25 per cent when axillary metastases are present.

Hodgkin's disease, lymphosarcoma and leukemia are also discussed in the chapter on malignant conditions.

All in all, this is a useful book for anyone doing radiation therapy. The new volume is a definite modernization of the now eleven-year-old second edition, which had five reprintings.

EDWARD SCHONS, M.D.

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**THE YEARS AFTER FIFTY.** By Wingate Johnson, M.D., Professor of Clinical Medicine and Chief of Private Diagnostic Clinic, Bowman Gray School of Medicine of Wake Forest College; Recent Appointee, Board of Trustees, the AMA. New York: Whittlesey House, McGraw-Hill Book Company, Inc. Price $2.00.

This short booklet will provide a very satisfactory evening's reading for any doctor with any degree whatever of geriatic understanding. It has some informative reading matter, which we may suggest or provide for many patients, for whom guidance in "growing old gracefully" has many advantages.

The author quotes avidly and well, and captions each well-devised chapter by inspiring excerpts from ageless literature. He draws all the way from Plato, Cicero and Saint Paul through Shakespeare, Samuel Johnson and Osler to Alvarez, Cowdry and Stieglitz. Needless to say, this philosophical connotation (as implied when Job laments, or Paul exults) dominates where the general purpose is to catalogue why the longer life of accomplishment and travail yields so abundantly in comparison to the life of speed and merriment.

It might be stated that the book is almost too concise to yield adequate information on the many subjects covered; perhaps it has been written and will best suffice as an introduction for those who will seek more information in the countless sources now easily available. The author writes as a wise and experienced internist, giving his impressions of what medicine now offers, to promote the comfort and usefulness of the ever-increasing group of our citizenry living beyond sixty years. The

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problem as to numbers may be sensed by this one quotation: "Statistics show that between 1930 and 1940, the total population of the United States gained only 7.2 per cent, while the number of people of sixty-five years or older increased by 35 per cent. It has been estimated that by 1960, the average life expectancy in the United States should reach 75 years." Every thoughtful person must begin to weigh in the balance what this means in our political, economic, educational and social developments. This is a useful book.

E. L. TUOHY, M.D.

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SYNOPSIS OF ALLERGY. Second Edition. Harry L. Alexander, A.B., M.D., Professor of Clinical Medicine, Washington University, School of Medicine, St. Louis; Editor of *The Journal of Allergy*. 255 pages. Illus. Price, $3.50. St. Louis: C. V. Mosby Company, 1947.

Certified as an allergist by the American Board of Internal Medicine in 1938 and enrolled as an active member in several national allergy associations, Dr. Alexander is well qualified to write this Synopsis of Allergy, of which this is the second edition. The first edition was published in 1941.

The contents cover history, atopy, bronchial asthma, hay fever, atopic rhinitis, gastrointestinal allergy, headache, conjunctivitis and other atopic disorders, allergic dermatoses, physical allergy, drug allergy, serum allergy, bacterial allergy, and vascular allergy. At the end is an appendix, which gives briefly, tests, diagnostic methods, elimination diets, et cetera, and a bibliography, which includes eighty-five references to books and journals.

The author gives a good, concise review of his subject, though it is too brief in its consideration of physical and emotional factors as they affect the allergic individual.

In format and type the book is similar to all the books in the Mosby Synopsis Series.

J. A. H.


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